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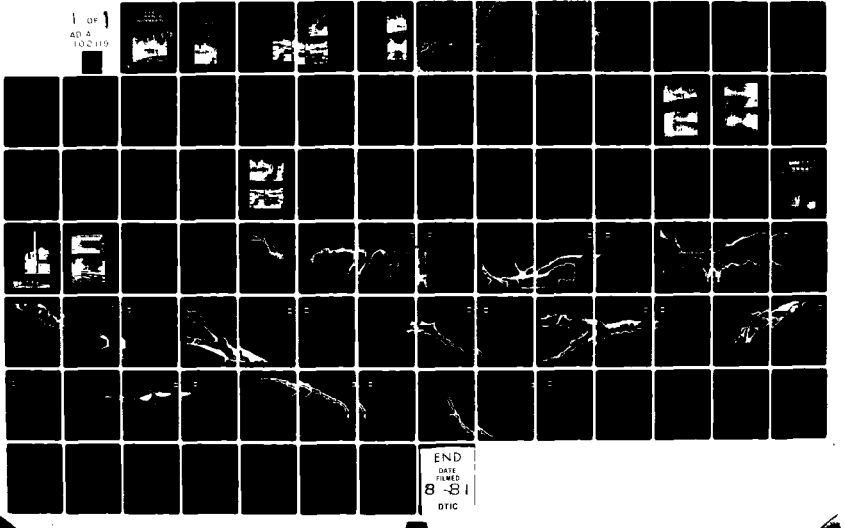

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FLOOD PLAIN INFORMATION LEVEL II

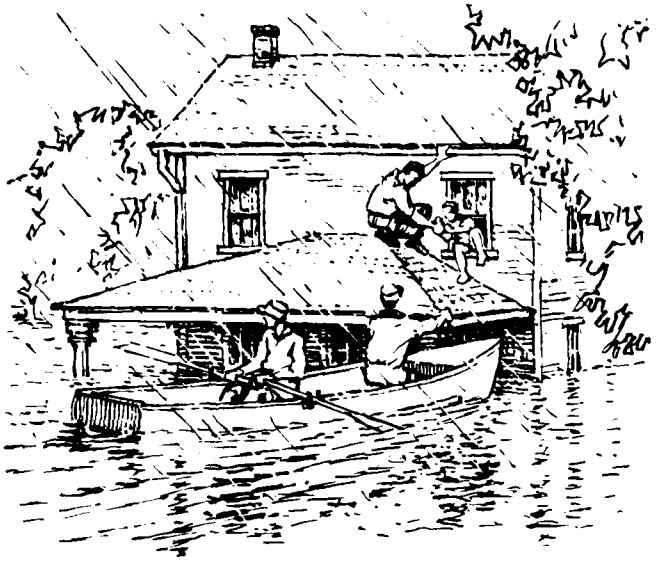
TOMS RIVER UNION BRANCH RIDGEWAY BRANCH AND LONG SWAMP CREEK

OCEAN COUNTY, NEW JERSEY

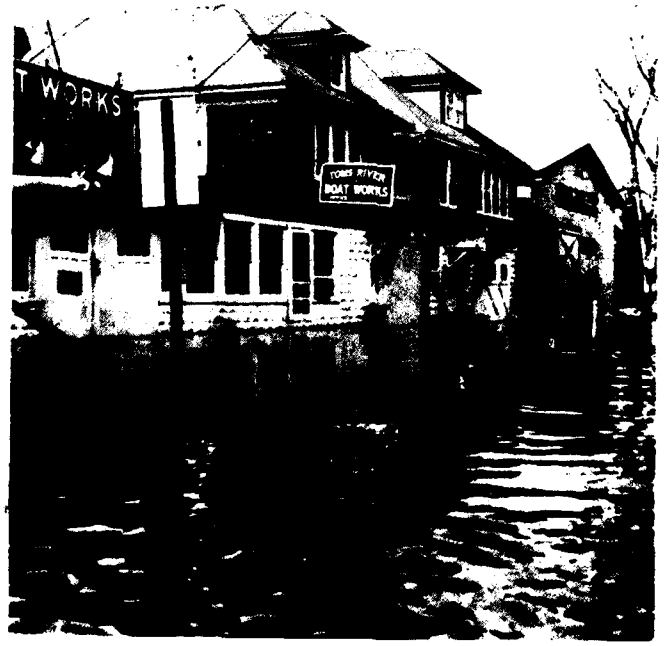
PREPARED FOR THE OCEAN COUNTY PLANNING BOARD BY THE DEPT. OF THE ARMY, PHILADELPHIA DISTRICT, CORPS OF ENGINEERS, PHILADELPHIA, PA.

JUNE 1972

FPI TOMS RIVER OCEAN COUNTY NJ



FLOODS
in TOMS RIVER
NEW JERSEY



FLOODS IN TOMS RIVER, NEW JERSEY

This folder is an announcement of and supplement to the "Flood Plain Information (FPI) Report, Toms River, Ocean County, New Jersey." The report has been prepared to emphasize the importance of flood potential and flood hazards in land use planning and to aid in management decisions concerning flood plain utilization.

Although the City of Toms River and other communities along Toms River, Union Branch, Ridgeway Branch, and Long Swamp Creek have not suffered extensive damage from past floods, studies indicate that larger floods may occur. Emphasis is given to future floods in the FPI Report. Maps, profiles and cross sections have been included to illustrate the possible extent and severity of future floods.

Included in this folder is a photograph showing possible future flood heights at the Toms River Boat Works. The flood height shown for a large flood, the New Jersey Floodway Design Flood (NJFDF), is one that occurs once in 100 years on the average, although it could occur in any year. Also indicated is the flood height that would be reached if a very large, Standard Project Flood (SPF), should occur. The SPF represents a reasonable upper limit of expected flooding in the study area.

HIGHEST FLOODS RECORDED ON TOMS RIVER
(At U.S.G.S. Gage #4085, Located
1 Mi. Downstream of Union Branch)

Date of Crest	Elevation Ft.-m.s.l.d.
May 31,1968	19.40
August 29, 1971	19.35
June 14, 1968	19.25
July 31, 1969	19.13
Overbank	16.1

POSSIBLE FUTURE FLOODS FOR PLANNING

Large (100 Year)—New Jersey Floodway Design Flood (NJFDF)	20.8
Very Large—Standard Project Flood (SPF)	26.7

Inside are sketches illustrating the horizontal and vertical relationships of flooded areas and a flood map from the FPI Report showing the extent of the Floodway Design and Standard Project Floods.

D ON TOMS RIVER
85, Located
ion Branch)

Elevation Ft.-m.s.l.d.
19.40
19.35
19.25
19.13
16.1

FOR PLANNING

y Floodway	20.8
od (NJFDF)	
Flood (SPF)	26.7

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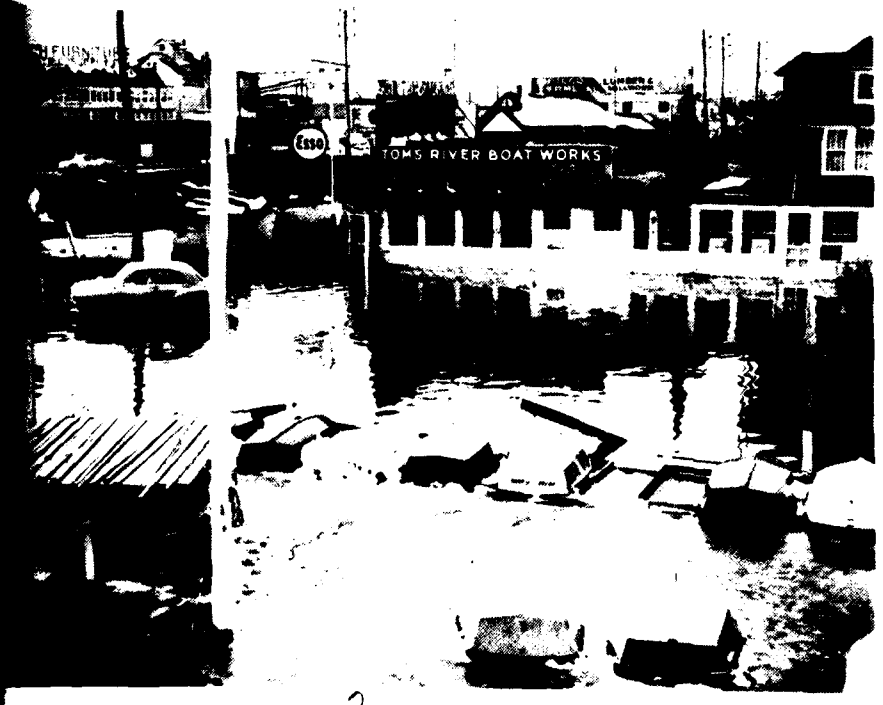
Possible future flood heights at Toms River Boat Works

Flooded Boat Works - March 1962



ACTION IS NEEDED

The flood plain of Toms River is moderately developed from Barnegat Bay past the Town of Toms River. With new economic growth and industrial and residential expansion in Ocean County, the flood plains upstream of Toms River will come under pressure for development. Now is the proper time to take actions which will prevent devastation from large floods.

Effective regulatory measures such as zoning ordinances, subdivision regulations, and building codes can be designed to prevent increased flood damages. Flood proofing can reduce potential damages to properties already subject to flooding. Works to modify flooding can also be a part of the long-run solution.

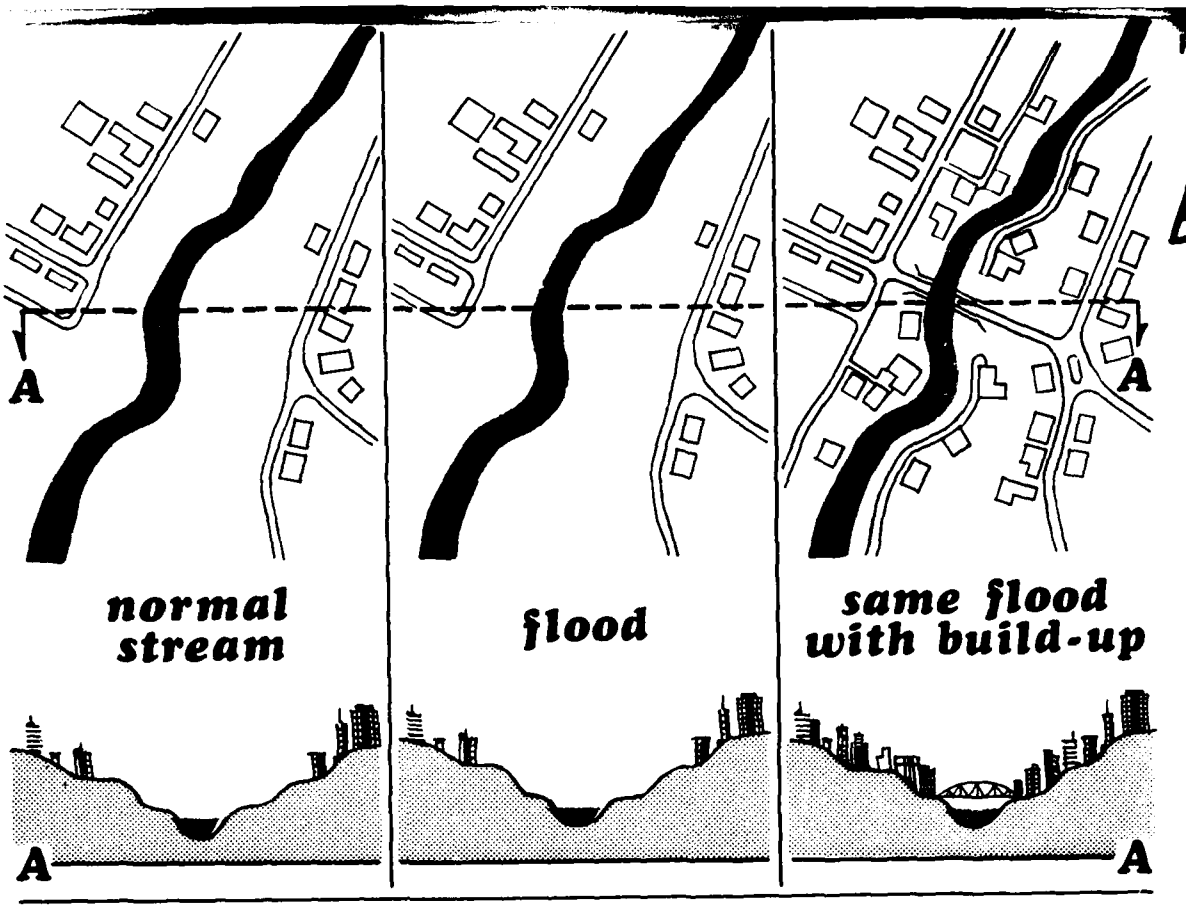
The communities along Toms River are not the only ones with flooding problems. Flood plain information has already been provided for many of several thousand flood-plagued communities. Nearly 400 of those having FPI Reports by mid 1971 have adopted or strengthened regulations, while 700 others have them under study. An additional 600 communities have used the FPI Reports to establish interim land use control.

This folder has been prepared for the Ocean County Planning Commission by the U. S. Army Corps of Engineers from data in the Report "Flood Plain Information, Toms River, Ocean County, New Jersey." Copies of the report and this folder are available upon request from the Ocean County Planning Board.

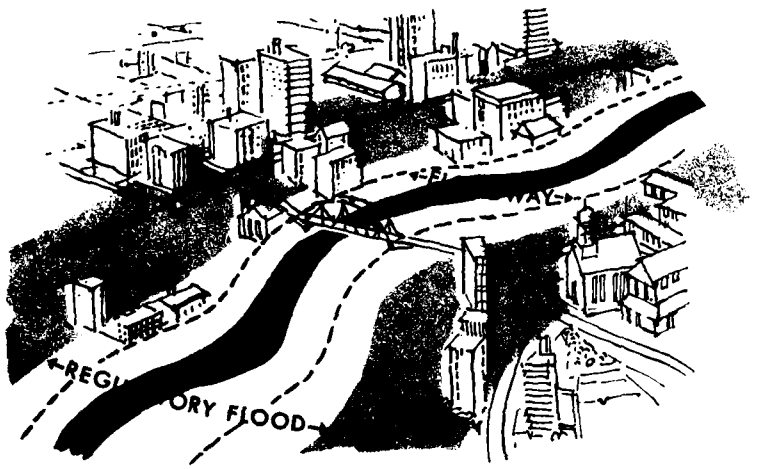
Brook Road over Union Branch

Union Branch Downstream of Dam

BUILDING in the FLOOD PLAIN can make FLOODS WIDER and DEEPER



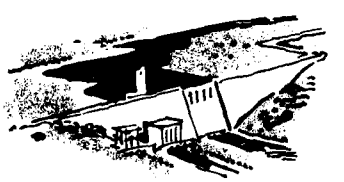
TOOLS of FLOOD PLAIN MANAGEMENT for the reduction of Flood Damage and



MEASURES TO REDUCE *VULNERABILITY TO FLOODS* *provide for a future with more freedom from flood damage, often at minor cost and with little adverse effect on the environment . . . . . .*

REGULATIONS
(ZONING, BUILDING CODES, SUBDIVISION)
• FLOOD PROOFING • RELOCATIONS •
• URBAN RENEWAL •

MEASURES TO MODIFY FLOODS
are often required to alleviate existing problems and sometimes to forestall future problems . . .



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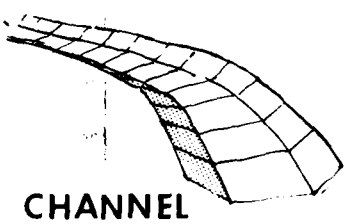
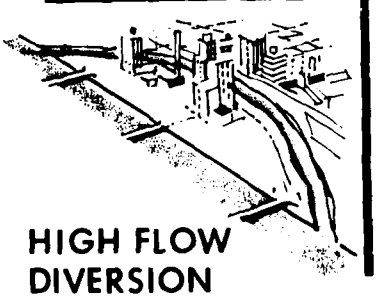
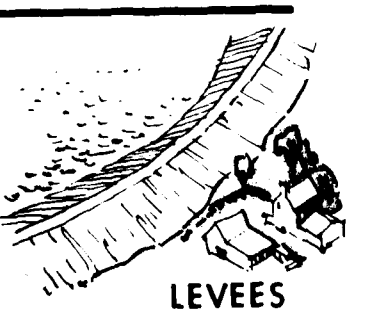


CHANNEL ENLARGEMENT



HIGH FLOW DIVERSION



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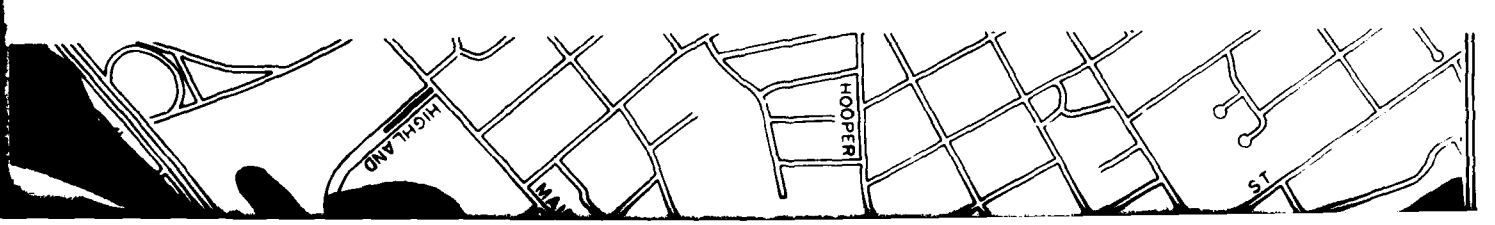

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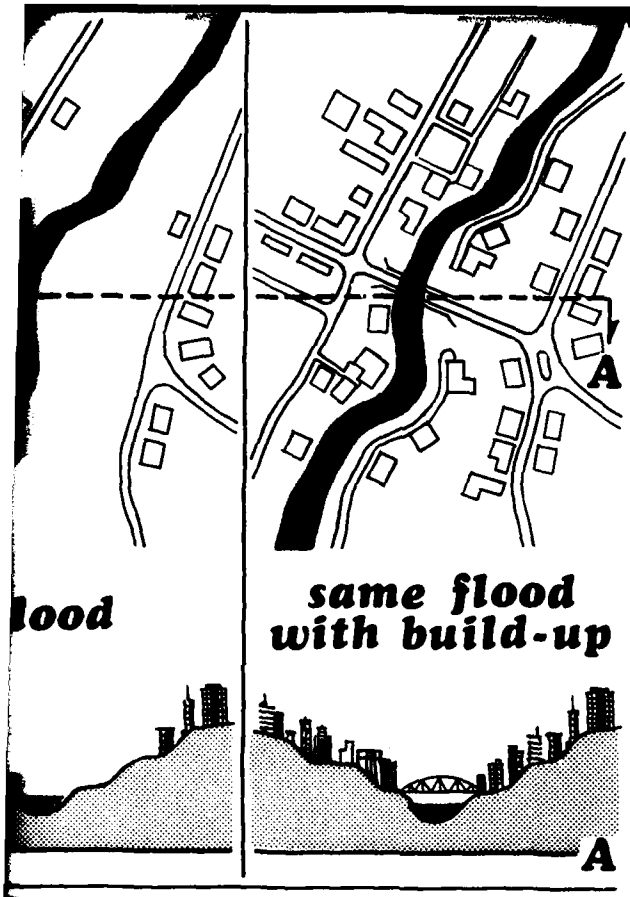

this ENCROACHMENT can change a Small Flood into a MAJOR FLOOD

the reduction of Flood Damage and Human Suffering

ASURES TO MODIFY FLOODS

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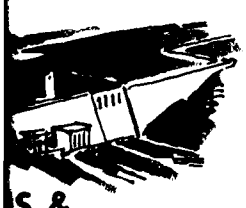

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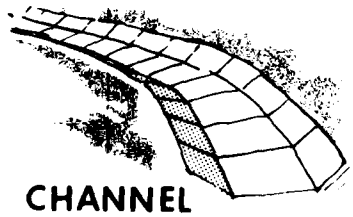

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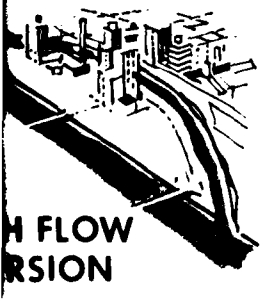

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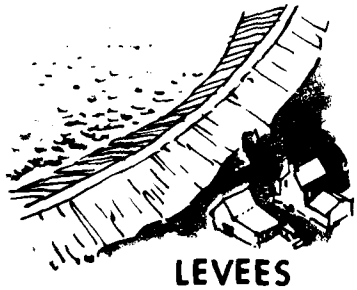

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OTHER MEASURES

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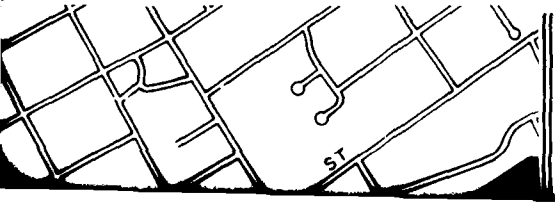
EDUCATION

TAX ADJUSTMENTS

FLOOD INSURANCE

WARNING & EMERGENCY PLANS



FLOOD PATTERNS
FOR TOMS RIVER
NEW JERSEY

adverse effect on the environment . . . . . .

REGULATIONS
(ZONING, BUILDING CODES, SUBDIVISION)
• FLOOD PROOFING • RELOCATIONS •
• URBAN RENEWAL •

HIGH FLOW DIVERSION

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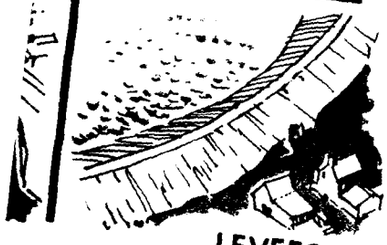
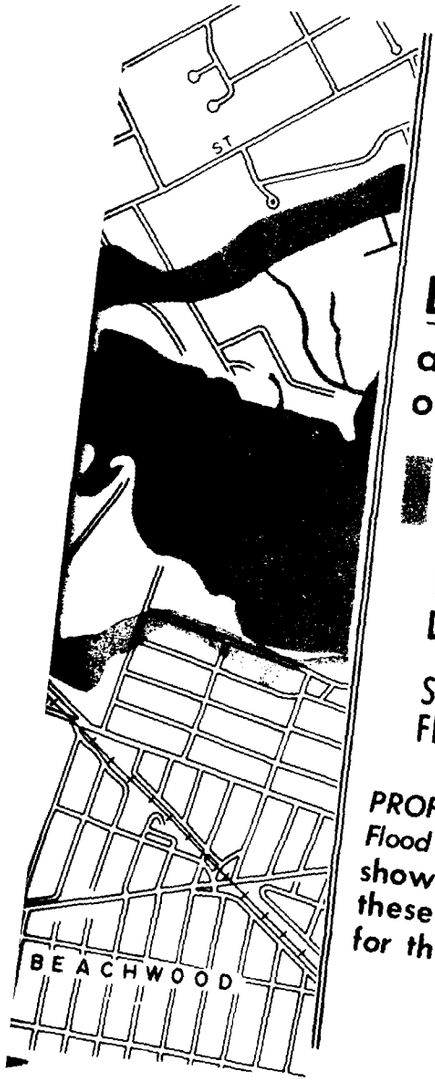


LEVEES

ADJUSTMENTS

FLOOD INSURANCE

WARNING & EMERGENCY PLANS



FLOOD PATTERNS
FOR TOMS RIVER
NEW JERSEY

LEGEND

approximate limits of overflow

NORMAL STREAM

N. J. FLOODWAY DESIGN FLOOD (NJFDF)

STANDARD PROJECT FLOOD (SPF)

PROFILES in the *Flood Plain Information Report* show elevations of these floods for the entire study area

TO THE REQUESTOR:

This Flood Plain Information (FPI) Report was prepared by the Philadelphia District office of the U.S. Army Corps of Engineers, under the continuing authority of the 1960 Flood Control Act, as amended. The report contains valuable background information, discussion of flood characteristics and historical flood data for the study area. The report also presents throug tables, profiles, maps and text, the results of engineering studies to determine the possible magnitude and extent of future floods, because knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning floodplain utilization. These projections of possible flood events and their frequency of occurrence were based on conditions in the study area at the time the report was prepared.

Since the publication of this FPI Report, other engineering studies or reports may have been published for the area. Among these are Flood Insurance Studies prepared by the Federal Insurance Administration of the Federal Emergency Management Agency, Flood Insurance Studies generall provide different types of flood hazard data (including information pertinent to setting flood insurance rates) and different types of floodplain mapping for regulatory purposes and in some cases provide updated technical data based on recent flood events or changes in the study area that may have occurred since the publication of this report.

It is strongly suggested that, where available, Flood Insurance Studies and other sources of flood hazard data be sought out for the additional, and, in some cases, updated flood plain information which they might provide. Should you have any questions concerning the preparation of, or data contained in this FPI Report, please contact:

U.S. Army Corps of Engineers
Philadelphia District
Custom House, 2nd and Chestnut Streets
Philadelphia, PA 19106

ATTN: Flood Plain Mgt. Services Branch, NAPEN-M

Telephone number: (215) 597-4807

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

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4. TITLE *(and Subtitle)*: Flood plain information, Toms River, Union Branch, Ridgeway Branch, and Long Swamp Creek, Ocean County, New Jersey	5. TYPE OF REPORT & PERIOD COVERED
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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Toms River, NJ	Ocean County Planning Board
Union Branch, NJ	Floods
Ridgeway Branch, NJ	Flood forecasting
Long Swamp Creek, NJ	Flood plains

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The portions of Ocean County covered by this report were subject to flooding from Tom's River and its tributaries, Union Branch, Ridgeway Branch, and Long Swamp Creek. These areas were moderately damaged by floods of 1950, 1962 and 1968. Included within the scope of this study was a history of flooding in Ocean County near Toms River. Special emphasis was given to these floods thru maps, photographs, profiles and cross sections.

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

Under authority of Section 206 of the 1960 Flood Control Act as amended the flood plain information was prepared by the U.S. Army Corps of Engineers Philadelphia District at the request of the Ocean County Planning Board. The information should be considered for its historical nature. Since the publication of this FPI report other Flood Insurance studies have been undertaken and should also be consulted for more current information.

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CONTENTS (Continued)

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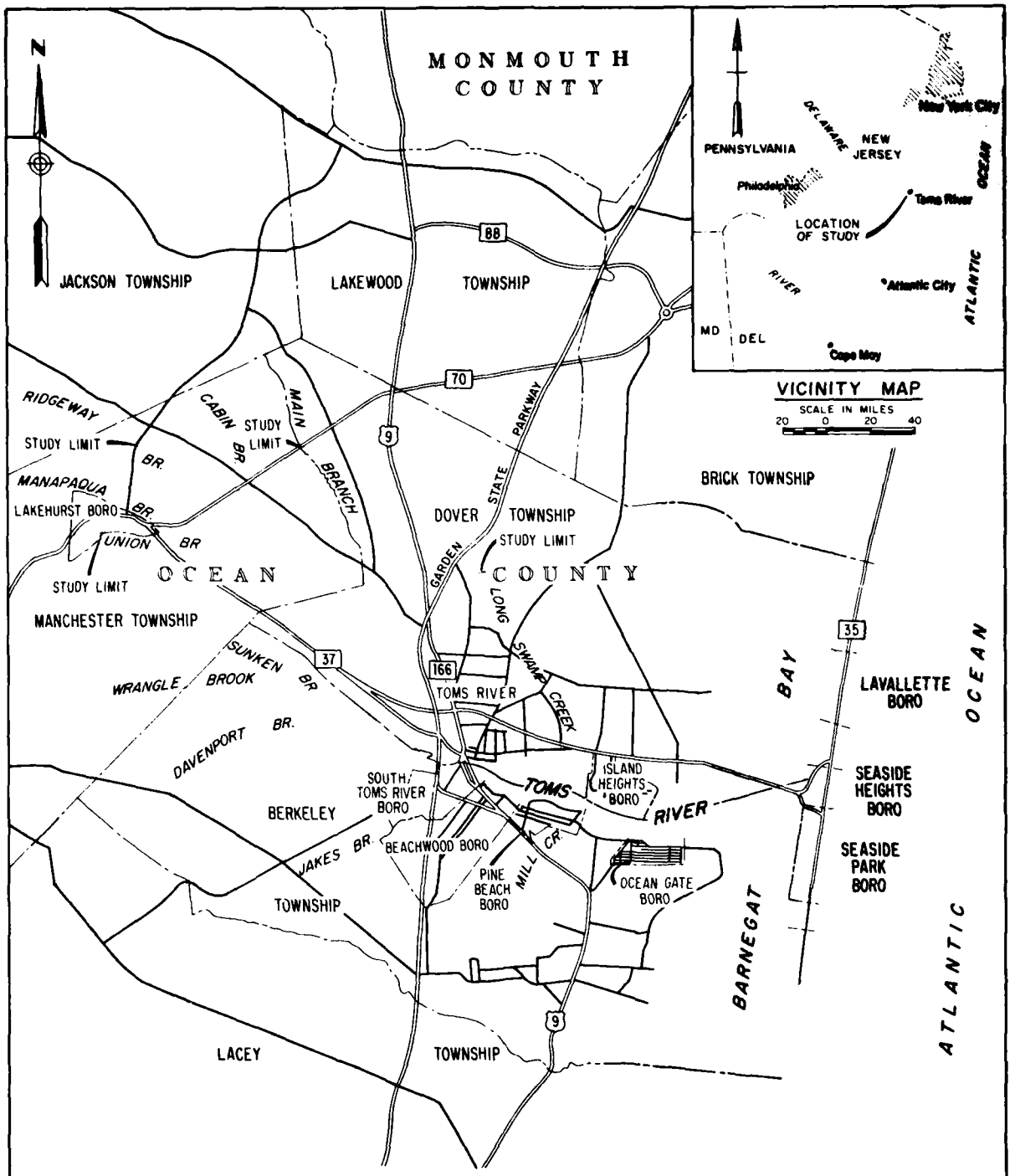
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RIDGEWAY
STUDY LIMIT
CABIN BR.
STUDY LIMIT
MAIN BRANCH
MANAPAQUA
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BERKELEY
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PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATION
TOMS RIVER
OCEAN COUNTY, N J
GENERAL MAP
JUNE 1972

PLATE 1

PREFACE

The portion of Ocean County covered by this report is subject to flooding from Toms River and its tributaries, Union Branch, Ridgeway Branch, and Long Swamp Creek. The properties along these streams are primarily residential and commercial and have been moderately damaged by floods of 1950, 1962 and 1968. The open spaces in the flood plains which may come under pressure for future development are extensive. Although large floods have occurred in the past, studies indicate that even larger floods are possible.

This report has been prepared because a knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain utilization. It includes a history of flooding in Ocean County near Toms River and identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles, and cross sections. The report does not provide solutions to flood problems; however, it does furnish a suitable basis for the adoption of land use controls to guide flood plain development and thereby prevent intensification of the loss problems. It will also aid in the identification of areas where other flood damage reduction techniques such as works to modify flooding and adjustments, including flood proofing, might be embodied in an overall Flood Plain Management (FPM) program. Other FPM program studies - those of environmental attributes and the current and future land use role of the flood plain as part of its surroundings - would also profit from this information.

At the request of the Ocean County Planning Board and endorsement of the New Jersey Department of Environmental Protection, this report was prepared by the Corps of Engineers, Philadelphia District Office, under continuing authority provided in Section 206 of the 1960 Flood Control Act, as amended.

Assistance and cooperation of the United States Geological Survey (U.S.G.S.), the Ocean County Engineering Department, the Ocean County Sun, and private citizens in supplying useful data and photographs for the preparation of this report are appreciated.

Additional copies of this report can be obtained from the Ocean County Planning Board. The Philadelphia District, Corps of Engineers, upon request, will provide technical assistance to planning agencies in the interpretation and use of the data presented as well as planning guidance and further assistance, including the development of additional technical information.

BACKGROUND INFORMATION

Settlement

Toms River was so named in the early seventeen hundreds for a personage by the name of Tom, but historians have no documented proof as to the specific person. He must have been an outstanding man in the area for individuals to designate the river as Toms River. The area surrounding Toms River is rich with the history of the Revolutionary War and formation of the early United States. Toms River was an important source of salt and charcoal for Washington's army. Privateers that hid in Barnegat Bay were able to prey on ocean going British ships and many valuable cargoes were sold at auction to the colonists in Toms River, New Jersey.

Industries and mills sprang up on the banks of Toms River as the settlers took advantage of the great timber and water supply. Sawmills produced large quantities of lumber for shipbuilding and construction. The shipbuilding industry attracted merchants and fishermen to this area and Toms River became an important early trade center.

The original industries and economic sources disappeared long ago, but the area is presently undergoing rapid development and vast amounts of open land are now being utilized for new industrial parks, commercial establishments, and residential areas. Much of this open land is part of the flood plain of Toms River and its tributaries. The number of encroachments on the flood plain will increase as this area experiences its greatest economic growth.

The Stream and Its Valley

Toms River originates in Millstone Township, Monmouth County, near the Monmouth-Ocean County Line. It flows through Ocean County where the largest part of the drainage basin is located. The drainage basin of Toms River has a total area of 188.5 square miles. Drainage areas contributing to runoff in the Toms River Basin are shown in Table 1.

Toms River, Union Branch, and Ridgeway Branch have physical characteristics similar to those of many other streams in this part of New Jersey. The land encompassing the stream is a gently-undulating plain having low relief. Stream gradients are very slight, varying from 5 to 6 feet per mile. Because of the flat gradient and low relief of surrounding land, Toms River and its tributaries have formed a broad, poorly-drained flood plain with abundant swamp and marshland. On the flood plain, the streams meander sharply from side to side in a series of tightly-compressed loops and are overgrown throughout their lengths with heavy brush and trees. Long Swamp Creek flows through more rugged terrain as indicated by its average slope of 13.5 feet per mile. The creek meanders very little compared to other tributaries, but the flat, swampy plain is still evident.

The tide at the mouth of Toms River is of equal elevation to that of Barnegat Bay, which is influenced by the tidal changes of the Atlantic Ocean. Tidal stages on Toms River are normally affected only 1 to 2 feet due to the protection of the river's mouth by a 23-mile long barrier beach and the great expanse of Barnegat Bay. The land area adjacent to the mouth of Toms River is a low, tidal salt marsh with numerous coves and fresh water creek outfalls.

The climate is generally mild with a few extreme temperature changes. The temperature may climb above 90° F. on some summer days or drop below 20° on some winter days. The annual precipitation for the area averages 50 inches per year. During the winter months, there is occasional snowfall, but very little water is contributed to the total runoff.

TABLE 1
DRAINAGE AREAS
TOMS RIVER, UNION & RIDGEWAY BRANCHES & LONG SWAMP CREEK

Location	Mileage Above Mouth	Drainage Area	
		Tributary	Total(a)
		sq. mi.	
Main Branch Toms River			
New Jersey Rt. 70	13.8	---	51.6
Union Branch	10.6	61.0	---
Confluence with Union Branch	10.6	---	117.0
At U.S.G.S. gage	8.8	---	124.0
Wrangle Brook	4.7	33.4	---
Long Swamp Creek	1.9	6.3	---
At Confluence with Barnegat Bay	0.0	---	188.5
Union Branch			
Ridgeway Branch	2.1	31.8	---
At Confluence with Main Branch Toms River	0.0	---	61.0
Ridgeway Branch			
New Jersey Rt. 547	4.7	---	27.2
At Confluence with Union Branch	0.0	---	31.8

(a) Drainage area includes tributary drainage

Developments in the Flood Plain

Toms River is highly developed from its mouth on Barnegat Bay to the Town of Toms River, New Jersey, which is located 4 miles upstream. The development on the flood plain consists primarily of private residences, but a few commercial buildings, a country club, a naval academy, and a yacht club are also located on the river banks in this area. This section of Toms River has been developed as a recreational area because of its access to Barnegat Bay and the Atlantic Ocean. Many docks have been constructed on the river to moor and service the large number of pleasure craft and several parks have been created in this area to preserve the natural beauty of the river.

Above the Town of Toms River, the flood plain of the river and its tributaries is relatively undeveloped, except for a short portion of Union Branch and Ridgeway Branch where the Borough of Lakehurst and Lakehurst Naval Air Station lie between these branches. The undeveloped flood plains of Toms River and its tributaries have limited agricultural use, but blueberries and cranberries grown here are important revenue producing crops. However, the Toms River area is presently undergoing intensive development, with many industrial parks being constructed along the railroad facilities and major highways. Some of these developments are infringing on the flood plain of Toms River. Continued industrial and commercial activity and subsequent increase in population will probably occur in the area, intensifying development of the flood plain.

Population trends shown on Table 2 indicate the rapid growth the area has undergone in recent years and there is every indication that this increase in population will continue.

TABLE 2
POPULATION TRENDS OF OCEAN COUNTY, NEW JERSEY [a]

Date	Population
1950	56,622
1960	108,241
1970	171,000 (Estimated)
1975	259,469 (Estimated)

(a) Source: Toms River, Dover Township, N.J., Office of the Industrial Commission Report entitled "A Statistical and Factual Analysis"

FLOOD SITUATION

Sources of Data and Records

The National Weather Service Branch of the National Oceanic and Atmospheric Administration (NOAA) maintains a non-recording precipitation gage at the Toms River Water Company.

The U.S.G.S. maintains a recording gage on Toms River near the Town of Toms River, New Jersey, and a maximum height gage located on Barnegat Bay. A record of flood stages dating back to 1928 was obtained from the Toms River gage; however, only seven years of record, since 1965, are available from the maximum height gage on Barnegat Bay. Peak tide elevations were also obtained from the Office of the Ocean County Engineer.

Useful information and data were taken from Special Report No. 29 of the State of New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply (now the Department of Environmental Protection, Division of Water Resources). This report, entitled "Geology and Ground Water Resources of Ocean County, New Jersey", was prepared in cooperation with the United States Department of the Interior in 1969.

To supplement the records at the gaging stations, newspaper files, historical documents and records were searched for information concerning past floods. These records have provided a knowledge of floods which have occurred on Toms River.

Maps were prepared from the U.S. Geological Survey Quadrangles drawn to a scale of 1:24,000 and having a contour interval of 10 feet. The following quadrangles were used: Seaside Park, New Jersey - 1953; Toms River, New Jersey - 1953; Lakewood, New Jersey - 1954; Lakehurst, New Jersey - 1957; Cassville, New Jersey - 1957; and, Roosevelt, New Jersey - 1957. Structural data on bridges and culverts, as well as stream cross sections, were obtained in field surveys performed by personnel of the Corps of Engineers, Philadelphia District.

Flood Season and Flood Characteristics

Floods occurring in the study area result from tropical hurricanes and "northeasters". The more common northeaster storm can occur during all times of the year and is characterized by its general rainfall over the entire drainage basin, which causes flooding in the upper reaches of Toms River. Tropical hurricanes comprise the majority of the most severe storms and occur during the late summer and fall. Hurricanes not only cause flooding due to heavy precipitation but also create unusually high tides and high winds, causing severe damage to coastal areas.

Factors Affecting Flooding and Its Impact

Obstructions to floodflows - Natural obstructions to floodflows include trees, brush and other vegetation growing along the stream banks in floodway areas. Man-made encroachments on or over the streams such as dams, bridges and culverts can also create more extensive flooding than would otherwise occur. Photographs taken 27 October 1971 to illustrate obstructions to floodflows are show in Figures 1 through 4. Figure 1 is Brook Road with the water level at the top of the wooden planks. Beacon Street bridge, Figure 2, is shown with the water level at the underclearance. Water pouring over the Pine Lake Dam on Union Branch is shown in Figure 3, and downstream view from the catwalk over the dam is provided in Figure 4.

During floods, trees, brush and other vegetation growing in floodways impede floodflows, thus creating backwater and increased flood heights. Trees and other debris may be washed away and carried downstream to collect on bridges and other obstructions to flow. As floodflow increases, masses of debris break loose and a wall of water and debris surges downstream until another obstruction is encountered. Debris may collect against a bridge until the load exceeds its structural capacity and the bridge is destroyed. The limited capacity of obstructive bridges or culverts, debris plugs at the culvert mouth or a combination of these factors retard floodflows and result in flooding upstream, erosion around the culvert entrance and bridge approach embankments and possible damage to the overlying roadbed.

In general, obstructions restrict floodflows and result in overbank flows and unpredictable areas of flooding, destruction of or damage to bridges and culverts, and an increased velocity of flow immediately downstream. It is impossible to predict the degree or location of the accumulation of debris; therefore, for the purposes of this report, it was necessary to assume that there would be no accumulation of debris to clog any of the bridge or culvert openings in the development of the flood profiles.

The two dams in the study area, one at Pine Lake, on Union Branch, and the other on Long Swamp Creek are of the low-flow type and have little or no flood control capacity nor will they seriously alter flow characteristics of flood waters.

Toms River, Union Branch, Ridgeway Branch, and Long Swamp Creek are spanned forty-five times by bridges and culverts. Pertinent information on all bridges and culverts can be found in Table 7 on Page 19. Many of these bridges are obstructive to floodflows.

Flood damage reduction measures - There are no existing local or county zoning ordinances, building codes or other regulatory measures specifically for the reduction of flood damages. This study has been requested so that it may be used as a basis for development of flood plain management regulatory measures that are to be included in pending legislation by Ocean County. However, the State of New Jersey enacted an Encroachment Law in 1929 which is essentially a preventive flood loss measure. The law is known as the "1929 Encroachment Law (R.S. 58:1-26)" and is administered by the Division of Water Resources of the Department of Environmental Protection. The law reads in part as follows:

> "No structure within the natural and ordinary high water mark of any stream shall be made by any public authority or private person or corporation without notice to the (Division) and in no case without

FIGURE 1 - The water level at Brook Road bridge over Union Branch is shown at the base of the roadway.

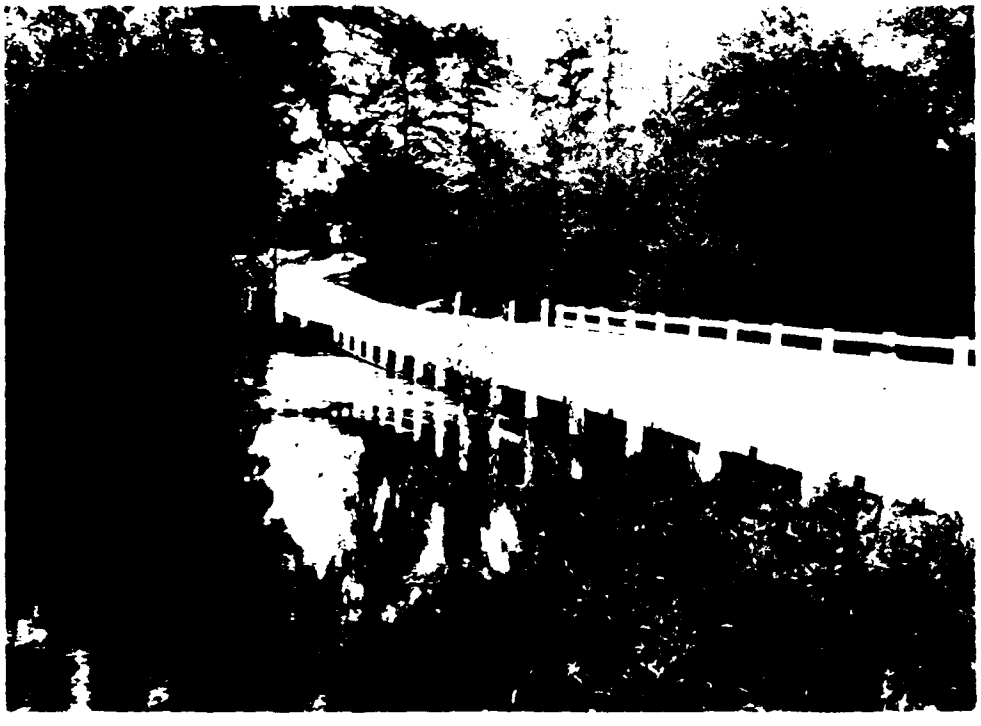


FIGURE 2 - Water level is at the underclearance of Beacon Street bridge over Union Branch.

FIGURE 3 - Water pouring over Pine Lake Dam on Union Branch

FIGURE 4 - Flood waters downstream of the Pine Lake Dam

> complying with such conditions as the (Division) may prescribe for preserving the channel and providing for the flow of water therein to safeguard the public against danger from the waters impounded or affected by such a structure and this prohibition shall apply to any renewal of existing structures." (a)

Under the provision of this law, the Division issues permits for the construction of bridges, culverts, fills, walls, channel improvements, pipe crossings and other encroachments located within the natural and ordinary high water mark of the stream. Another New Jersey Encroachment Law [Chapter 229, Laws of 1938, amending a previous law known as R.S. 40:56-1], permits municipalities of the State to construct improvements, remove obstructions, define the location, establish widths, grades and elevations of any stream and to prevent encroachments thereon - subject to approval by the State, of the flood carrying capacity to be provided. Under this law, counties in New Jersey are permitted to assist municipalities in local flood damage alleviation programs. The New Jersey flood plain designation and marking law, enacted in 1962 [R.S. 58:16A (50-54)], empowers the Division of Water Resources to delineate and mark flood hazard areas and coordinate effectively the development, dissemination, and use of information on floods and flood damage that may be available. The development of adequate flood plain information furnished in this report will enable state and local authorities to further implement existing statutes and regulations.

Other factors and their impacts - The Toms River area is subject to fluvial flooding from Toms River and its tributaries and tidal flooding from Barnegat Bay. When high runoff from Toms River and its tributaries occurs during high tide stage in Barnegat Bay, it aggravates the flooding by increasing the height and duration of the river's backwater effect. Flooding and threats of flooding promote action by local officials in flood warning and flood fighting activities. Material stored and boats moored in the flood plain loom as adverse factors during floods.

Flood warning and forecasting - The National Weather Service Branch of the National Oceanic and Atmospheric Administration (NOAA) maintains year-round surveillance of weather conditions at Atlantic City, New Jersey. Commercial radio stations receive information from the National Weather Service and broadcast it to the public through the Emergency Weather Network in cooperation with the New Jersey Civil Defense Disaster Control (CD-DC). The State CD-DC also works closely with the National Weather Service, the agency responsible for tracking hurricanes and tornadoes. In times of emergency, the State CD-DC maintains close contact with county, local and civil defense offices through its own communications network.

Flood fighting and emergency evacuation plans - There are no formal flood fighting or emergency evacuation plans for Ocean County but provisions are made for alerting the news media, municipal officials, local police and fire departments, rescue squads, and the general populace through the Ocean County Civil Defense Office. In times of extreme emergencies, this Civil Defense Office coordinates local units in flood fighting, emergency evacuation, and rescue operations. During disasters, men and machines from the New Jersey State National Guard and nearby military installations render assistance to the local communities upon request.

(a) "Flood Damage Alleviation in New Jersey", Water Resources Circular No. 3, 1961, State of New Jersey Department of Environmental Protection.

Material storage on the flood plain - There is very little material stored on the flood plains in the upper reaches of Toms River. The lower reaches of Toms River are more industrially developed and there are large quantities of floatable materials stored on the flood plain such as lumber, crates and lightweight containers. There are also many small craft moored on Toms River and in yacht basins along the river. During time of floods, these floatable materials and small craft may be carried away by floodflows causing serious damage and additional hazards to life and property.

PAST FLOODS

Summary of Historical Floods

The highest stage of record for Toms River was estimated from a flood mark set in September 1938, but the actual gage reading was not available. The second highest stage was recorded in May 1968 and the third highest stage was recorded in August 1971. It is interesting to note that four of the five highest flows occurred within the last three years.

High tides on the Atlantic Ocean affect flooding on Toms River from its mouth in Barnegat Bay to a point approximately 4 miles upstream. Flooding due to high tides or a combination of high tides and floodflows occurred in September 1944, November 1950, and March 1962.

Flood Records

Information on historical floods in the Toms River area was obtained from the stream gaging station and the maximum tide height gage maintained by the U.S.G.S. in the Town of Toms River. Flood crest elevations from the Toms River gage are shown in Table 3. Precipitation records from the National Weather Service gage located at the Toms River Water Company are shown in Table 4. High water marks of past floods were obtained, residents in the area were interviewed, and newspaper files and historical documents were searched for information concerning past floods. Photographs of the March 1962 flood in Toms River were courteously provided by Mr. Fred Thornes of Toms River, New Jersey, and are shown in Figures 5 and 6 on Page 13.

TABLE 3
FLOOD CREST ELEVATIONS
Toms River, Near Toms River, New Jersey [a]

Date of Crest	Estimated Peak Discharge cfs	Stage [c] feet	Elevation [d] feet - m.s.l.d.
April 18, 1929	851	8.95	17.05
August 26, 1933	835	8.86	16.96
September 8, 1935	787	8.65	16.65
March 14, 1936	739	8.30	16.40
June 29, 1938	1,440(b)	11.10	19.20
July 26, 1938	1,060	10.15	18.25
September 23, 1938	2,000(b)	12.50	20.60
February 5, 1939	808	8.73	16.83
August 22, 1939	902	9.32	17.42
September 17, 1944	1,140	10.58	18.68
December 1, 1945	873	8.82	16.92
December 31, 1945	763	8.17	16.27

TABLE 3 (*Continued*)
FLOOD CREST ELEVATIONS
Toms River, Near Toms River, New Jersey [a]

Date of Crest	Estimated Peak Discharge cfs	Stage [c] feet	Elevation [d] feet - m.s.l.d.
June 2, 1948	742	8.05	16.15
June 2, 1949	816	8.48	16.58
December 23, 1951	818	8.37	16.47
April 29, 1952	1,250	10.53	18.63
June 3, 1952	882	8.72	16.82
March 15, 1953	878	8.70	16.80
August 15, 1955	909	8.86	16.96
February 2, 1958	1,160	10.09	18.19
August 27, 1958	776	8.15	16.25
October 28, 1958	941	9.03	17.13
September 14, 1960	1,370	10.57	18.67
August 15, 1961	938	8.95	17.05
March 14, 1962	965	9.06	17.16
September 23, 1966	808	8.27	16.37
August 6, 1967	842	8.45	16.55
May 31, 1968	1,610	11.30	19.40
June 14, 1968	1,555	11.15	19.25
July 31, 1969	1,510	11.03	19.13
August 29, 1971	1,590	11.25	19.35

(a) U.S.G.S. Gage No. 4085, established October 1928
(b) Estimated discharge from flood mark.
(c) Bankfull stage is 8.0 feet.
(d) Mean sea level datum, 1929 General Adjustment Datum.

TABLE 4
PRECIPITATION AT TOMS RIVER, NEW JERSEY
(National Weather Service Gage at Toms River Water Company) [a]

Occurrence	Amount of Precipitation inches	Time Period hours
May 28-29, 1968	4.17	29
August 27-28, 1971	5.19	14-½
June 12-14, 1968	2.80	20
July 27-30, 1969	7.78	18

(a) National Weather Service Gage No. 8816.

Flood Description

The following newspaper excerpts and photographs provide a vivid description of the flooding along Toms River caused by heavy precipitation and high tides.

25 November 1950 - This "Thanksgiving Day" flood inundated the low-lying lands encompassing Barnegat Bay and the mouth of Toms River. Flood tides driven by wind action caused damage to various marine facilities. Tidal heights experienced in southern Ocean County exceeded those at Toms River.

EXCERPTS FROM THE OCEAN COUNTY SUN,
25 NOVEMBER 1950 [a]

"Howling Gales and Flood Tides"
"Million Dollars Damage in Ocean County"
"Island Heights Lost its 1,200ft. Boardwalk Erected in 1949 at $20,000- Total Damages Estimated at $100,000"

Toms River

"Dozens of Docks were Ripped Out By Tides and Many Boats Were Sunk"

"Low Areas Were Submerged"

"Power Service for 80,000 of 113,000 Knocked Out"

6-7 March 1962 - This storm ravaged and almost obliterated the coast line of New Jersey. It caused such a great disaster that special reports on the damage were published by local newspapers.

Excerpts from a magazine entitled
"The Great March Storm – 1962," Published by the
Ocean County Sun

On March 6, a violent storm - perhaps the worst within memory - smashed the New Jersey coast line, rendering it helpless and almost unrecognizable. The storm brought to Ocean County a thick swirling snowfall, roaring winds, and towering seas.

Little of the exposed Ocean County coast line was spared damage as gale winds, wet snow, and thundering surf combined in an awesome display of elements in a murderous mood.

Inland

Even communities well away from the coast were not spared completely from the storm ravages. Snow clogged county roads, and several thousand families lost electricity for varying periods.

In river front communities, such as Toms River, Beachwood, Island Heights, Pine Beach, and Ocean Gate, low streets were flooded and docks disappeared under water for several days as high winds kept extreme high tides from receeding.

Sheltered marinas along the rivers were for the most part spared, but marinas in the open bay areas reported widespread damage to boats and equipment.

(a) Simulated from newspaper clippings.

FIGURE 5 - Flood of March 1962 at Toms River Boat Works.

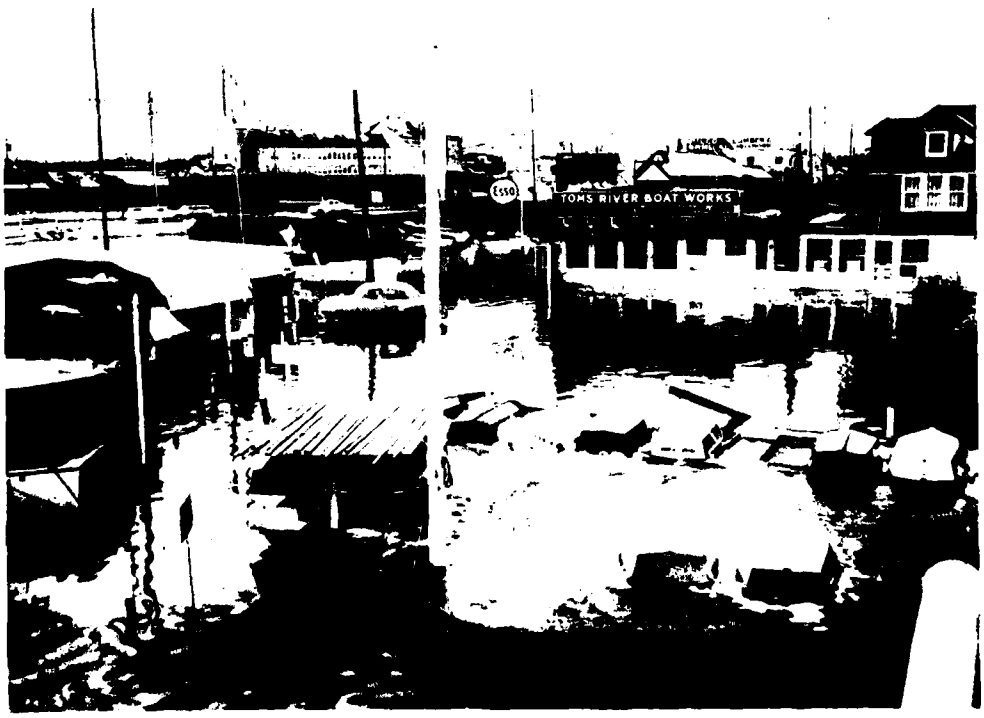


FIGURE 6 - March 1962 flood at Toms River Boat Works. Note small boats stowed on the flood plain.

FUTURE FLOODS

Floods of the same or larger magnitude as those that have occurred in the past could occur in the future. Large floods have been experienced in the past on streams with similar geographical and physiographical characteristics as those found in the study area. Similar combinations of rainfall and runoff which caused these floods could occur in the Toms River area. Therefore, to determine the flooding potential of the study area, it was necessary to consider storms and floods that have occurred in regions of like topography, watershed cover and physical characteristics. Discussion of the future floods in this report is limited to those that have been designated as the Floodway Design Flood, the Flood Hazard Area Design Flood, and the Standard Project Flood. The estimates of the Floodway Design Flood, the Flood Hazard Area Design Flood, and the Standard Project Flood as presented in this report are based on the existing development of the watershed since future changes within the basin cannot be accurately predicted.

Floodway Design Flood and Flood Hazard Area Design Flood

The State of New Jersey defines "Floodway" as the channel and portion of the adjacent flood plain necessary to preserve the natural regimen of a stream for the reasonable passage of the Floodway Design Flood (FDF). "Flood Hazard Area" includes the Floodway and any additional portions of the flood plain inundated by the Flood Hazard Area Design Flood (FHADF).

Both of these design floods are used extensively by the State of New Jersey for flood plain management programs. The method used for determination of these floods is described in the "New Jersey Flood Hazard Report No. 1, Delineation of Flood Hazard Areas". This method applies "multiples" to the mean annual flood as determined from a regional analysis presented in the New Jersey Water Resources Circular No. 13, "Floods in New Jersey: Magnitude and Frequency". The circular was prepared in 1964 by the U.S. Geological Survey in cooperation with the State of New Jersey. Certain modifications were made to these results which reflect the 43 years of record from the U.S. Geological Survey gage. Peak flows developed for the Floodway Design Flood and the Flood Hazard Area Design Flood are given in Table 5. Since the State of New Jersey's criteria is not strictly defined for small drainage areas, the peak flows for Long Swamp Creek are only listed near the mouth.

The lack of Barnegat Bay tide data, only seven years of record and several high water marks, precluded a precise determination of tidal stage-frequency relationships for Toms River; however, using the gage data available from the Atlantic City, U.S.G.S. gaging station, pertinent information was developed. The estimated height of a 100-year tidal event is +6.6 feet, mean sea level datum. The 100-year tide is defined as one that occurs once in 100 years on the average, although it could occur in any year. This 100-year tide has approximately the same chance of occurrence as the Floodway Design flood in the Toms River Area.

Standard Project Flood

The Standard Project Flood is defined as a major flood that can be expected to occur from a severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the study area is located, excluding extremely rare combinations. The Corps of Engineers, in cooperation with the NOAA Weather Service, has made comprehensive studies and investigations based on the past records of experienced storms and floods, and has developed generalized procedures for estimating the flood potential of streams. As in the case of estimating the 100-year tide, gage data available from the Atlantic City gage was used in the determination of a Standard Project Tide.

Peak discharges for the Floodway Design Flood, the Flood Hazard Area Design Flood, and the Standard Project Flood at selected locations in the study area are shown in Table 5. Discharge hydrographs for the Standard Project Flood at the U.S. Geological Survey gage on Toms River, at the mouth of Union Branch, and at the mouth of Ridgeway Branch are shown on Plate 19. The relative flood heights of the Intermediate Regional Tide, Floodway Design Flood, Standard Project Flood, and other recorded floods are shown in Table 6.

TABLE 5
PEAK FLOWS FOR FLOODWAY DESIGN, FLOOD HAZARD AREA DESIGN AND STANDARD PROJECT FLOODS

Location	River Mile	Drainage Area Sq. Mi	Floodway Design Flood Discharge cfs	Flood Hazard Area Design Flood Discharge cfs	*Standard* Project Flood Discharge cfs
At Mouth	0.0	188.5	(a)	(a)	(a)
Downstream of Confluence with Wrangle Brook	4.7	162.2	3,900	5,100	15,300
Upstream of Confluence with Wrangle Brook	4.7	128.8	3,100	4,000	10,800
At U.S.G.S. Gage	8.8	124.0	2,800	3,600	10,500
Downstream of Confluence with Union Branch	10.6	117.0	2,800	3,600	10,100
Upstream of Confluence with Union Branch	10.6	56.0	1,800	2,300	4,600
Long Swamp Creek Tributary					
Near Mouth	0.0	6.3	640[a]	800[a]	1,500[a]
Union Branch Tributary					
At Mouth	0.0	61.0	1,000	1,300	5,500

TABLE 5 (Continued)
PEAK FLOWS FOR FLOODWAY DESIGN, FLOOD HAZARD AREA DESIGN AND STANDARD PROJECT FLOODS

Location	River Mile	Drainage Area Sq. Mi	Floodway Design Flood Discharge cfs	Flood Hazard Area Design Flood Discharge cfs	Standard Project Flood Discharge cfs
Downstream of Confluence with Ridgeway Branch	2.1	59.7	950	1,125	5,000
Upstream of Confluence with Ridgeway Branch	2.1	27.9	500	585	2,000
Ridgeway Branch					
At the Mouth	0.0	31.8	450	540	3,000
N.J. Highway Rt. 547	4.5	27.2	400	500	2,500

(a) Heights of flooding are governed by tides in lower reaches of Toms River and Long Swamp Creek.

TABLE 6
RELATIVE FLOOD HEIGHTS ON TOMS RIVER AND UNION BRANCH

Flood	River Mile	Estimated Peak Discharge cfs	Referenced Flood Elevation (d) feet-msld	Height Above Referenced Flood Feet
		Toms River		
November 25, 1950	3.4	(a)	5.6	0.0
Intermediate Regional (100 Year Tide)		(b)		1.0
Standard Project Tide		(b)		5.4
November 25, 1950	3.9	(a)	5.9	0.0
Floodway Design		4,000		1.0
Standard Project Tide		(b)		5.1
May 31, 1968	5.37	–	6.4	0.0
Floodway Design		3,100		4.6
Standard Project		10,800		10.8
May 31, 1968	6.29	–	9.0	0.0
Floodway Design		3,100		5.4
Standard Project		10,800		11.1
May 31, 1968	8.85	1,610	19.4	0.0
Floodway Design	Gage	2,800		1.4
Standard Project		10,150		7.3
September 23, 1938	8.85	2,000 (c)	20.6	0.0
Floodway Design	Gage	2,800		0.2
Standard Project		10,150		6.1
May 31, 1968	10.9	–	25.9	0.0
Floodway Design		1,800		3.6
Standard Project		4,600		7.8

TABLE 6 (Continued)
RELATIVE FLOOD HEIGHTS ON TOMS RIVER AND UNION BRANCH

Flood	River Mile	Estimated Peak Discharge cfs	Referenced Flood Elevation (d) feet-msld	Height Above Referenced Flood feet
		Union Branch		
May 31, 1968	1.51		30.5	0.0
Floodway Design		960		0.6
Standard Project		5,400		6.6

(a) High stage affected by storm tide and stream flow combination.
(b) Tide causes higher stage than stream flow.
(c) Discharge estimated by extrapolation of stream gage rating curve.
(d) Mean sea level datum, 1929 General Adjustment Datum

Frequency

A frequency curve of flow versus recurrence interval was constructed on the basis of computed flows up to and including the Floodway Design Flood. The frequency curve thus derived, which is available on request, reflects the judgment of engineers who have studied the area and are familiar with the region; however, it must be regarded as approximate and should be used with caution in connection with any planning of flood plain use. Floods larger than the Standard Project Flood are possible but the combination of factors necessary to produce such large flows would be extremely rare.

Hazards of Large Floods

The extent of damage caused by any flood depends on the topography of the area flooded, depth and duration of flooding, velocity of flow, rate of rise, and developments in the flood plain. Flood stages on Toms River would result in inundation of many low-lying commercial and residential areas. Deep floodwater flowing at high velocity and carrying floating debris would create conditions hazardous to persons and vehicles attempting to cross flooded areas. In general, floodwater three or more feet deep and flowing at a velocity of three or more feet per second could easily sweep an adult person off his feet, thus creating definite danger of injury or drowning. Rapidly rising and swiftly flowing floodwater may trap persons in homes that are ultimately destroyed, or in vehicles that are ultimately submerged or floated. Water lines can be ruptured by deposits of debris and the force of floodwaters, thus creating the possibility of contaminated domestic water supplies. Damaged sanitary sewer lines could result in the pollution of floodwaters creating health hazards. Isolation of areas by floodwater could create hazards in terms of medical, fire or law enforcement emergencies.

Flooded areas and flood damages - The study areas in Ocean County that would be inundated by the Standard Project Flood on Toms River are shown on Plate 2, which is also an index map to Plates 3 through 13. Plates 3 through 13 show in detail the areas that would be flooded by the Floodway Design, Flood Hazard Area Design, and Standard Project Floods. Some plates show flooded area outlines that only delineate the Floodway Design and Standard Project Floods, as the Flood Hazard Area Design Flood would not be readily distinguishable from the Floodway Design Flood. The actual limits of these overflow

areas may vary from those shown on the maps because the 10-foot contour interval and scale of the maps do not permit precise plotting of the flooded area boundaries. As may be seen from these plates, large portions of the communities on Toms River between its mouth and the Garden State Parkway would be inundated by large floods. The highest flood stages would result from a combination of fluvial flooding from Toms River and peak tides on Barnegat Bay although fluvial and tidal flooding may occur independently. Note that a portion of Island Heights would be isolated by a Standard Project Tide. The Floodway Design Flood, the Flood Hazard Area Design Flood and the Standard Project Flood on Union and Ridgeway Branches would also inundate areas of Pine Lake Park. Areas flooded by the Floodway Design, Flood Hazard Area Design, and Standard Project Floods include recreational areas, commercial and industrial properties and the associated streets, roads, and utilities. Considerable damage to these facilities would occur during a Floodway Design Flood. Due to its wider extent, greater depths, higher velocities, and longer duration, the Standard Project Flood will cause more severe damage than either the Floodway Design Flood or the Flood Hazard Area Design Flood. Plates 14 and 15 show water surface profiles for the Floodway Design, Flood Hazard Area Design, and Standard Project Floods on Toms River, Union Branch, and Ridgeway Branch. Plate 16 indicates water surface profiles on Long Swamp Creek for the Floodway Design and Standard Project Floods only, as the increase in flood heights between the Floodway Design and Flood Hazard Area Design Floods is relatively small for this tributary. Depths of flow in the channel can be estimated from these profiles. Typical cross sections of the flood plain at selected locations, together with the water surface elevation and lateral extent of the various design floods, are shown on Plates 17 and 18.

Obstructions - During floods, debris collecting on bridges and culverts could decrease their carrying capacity and cause greater water depths (backwater effect) upstream of these structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing profiles of the Floodway Design, Flood Hazard Area Design and Standard Project Floods. Similarly, the maps of flooded areas show the backwater effect of obstructive bridges and culverts, but do not reflect increased water surface elevation that could be caused by debris collecting against the structures, or by deposition of silt in the stream channel under structures. As previously indicated, there are two dams within the study area which have no flood control capacities nor will they seriously alter flow characteristics of floodwaters. Of the forty-five bridges and culverts crossing the streams in the study area, most of them are obstructive to the Floodway Design Flood and Flood Hazard Area Design Flood and even more are obstructive to the Standard Project Flood. In some cases bridges may be high enough so as not to be inundated by floodflows; however, the approaches to these bridges may be at lower elevations and subject to flooding and rendered impassable. Table 7 lists water surface elevations at selected bridges and culverts that may be restrictive during floodflows.

TABLE 7
ELEVATION DATA
Bridges Across Toms River, Union & Ridgeway Branches and Long Swamp Creek

Identification	Mileage Above Mouth	Underclearance Elevation feet-msld	Water Surface Elevation[a] Floodway Design Flood feet-msld	Flood Hazard Area Design Flood feet-msld	Standard Project Flood feet-msld
Main Branch Toms River					
N.J. Rt. 166	3.96	5.6	7.9	8.4	11.6
Main Street	3.98	4.4	8.0	8.6	11.9
Central R.R. of N.J.	4.04	3.9	8.1	8.7	12.2
Garden State Parkway	4.59	12.8	8.8	9.5	13.3
Central R.R. of N.J.	4.80	3.5	9.3	10.1	14.2
Water St.	5.38	12.9	11.0	12.0	17.2
N.J. Rt. 37	6.30	9.3	14.4	15.6	20.4
Oak Ridge Parkway	8.85	20.6	20.8	21.8	26.8
Toms River-Ridgeway Rd.	10.91	26.2	29.2	30.0	33.7
N.J. Rt. 70	13.80	49.9	47.0	47.8	51.1
Union Branch					
Tenth St.	0.99	26.7	30.3	31.0	35.7
Tenth St.	1.05	27.2	30.5	31.1	36.1
Commonwealth Blvd	1.20	29.6	30.7	31.5	36.6
Beacon St.	1.51	28.9	31.2	32.0	37.1
Colonial Dr.	4.96	47.3	46.1	46.6	50.2
N.J. Rt. 37	5.26	50.3	49.3	49.8	53.1
Wrangle Brook Rd.	5.43	50.0	51.5	51.8	54.5
Central R.R. of N.J.	5.76	56.6	53.0	53.4	55.9
Abandoned R.R.	5.87	56.6	54.2	54.6	56.9
Central R.R. of N.J.	5.94	59.9	55.2	55.7	57.9
Brook Rd.	6.21	55.0	57.2	57.5	59.6
Lake Rd.	6.34	62.5	58.4	58.7	60.3
Ridgeway Branch					
N.J. Rt. 70	1.84	44.4	39.6	39.9	44.1
Central R.R. of N.J.	3.32	60.8	48.5	48.7	51.7
Lakehurst Rd.	3.82	54.0	50.2	50.4	53.9
N.J. Rt. 547	4.51	55.7	55.2	55.6	58.3
Long Swamp Creek					
Washington St.	0.32	11.1	12.5		13.5
N.J. Rt. 37	0.45	13.9	16.0		18.0
Batchelor St.	0.51	13.3	18.0		19.0
Bridle Path Bridge	0.66	14.3	18.5		19.5
Private Rd.	0.90	17.7	20.0		21.0
Private Rd.	1.02	17.6	21.5		22.7
Dave Marion Rd.	1.23	21.0	23.5		24.0
Cedar Grove Rd.	1.42	23.9	27.0		28.5
Lester Dr.	1.71	25.0	27.0		30.5
Hooper Ave.	2.31	31.5	37.0		37.7
Bey Lea Rd. [b]	2.82	40.0	42.3		43.2

(a) Mean sea level datum
(b) The minor culverts & bridges within the Bey Lea Golf Course are not listed

Velocities of flow - Velocities of flood waters depend largely on the size and shape of the stream cross section, slope of the stream, and physical condition of the stream bed, all of which vary on different streams and at different locations on the same stream. Table 8 shows the average channel and overbank velocities for the Floodway Design Flood and the Standard Project Flood at selected locations.

TABLE 8
MAXIMUM AVERAGE VELOCITIES
Toms River, Union & Ridgeway Branches & Long Swamp Creek

Location	Mileage Above Mouth	Channel Velocity		Overbank Velocity[a]	
		Floodway Design Flood	Standard Project Flood	Floodway Design Flood	Standard Project Flood
		feet per second		feet per second	
Main Branch Toms River					
Downstream of N.J. Rt. 166	3.9	2.5	5.1	0.4	0.7
Downstream of Water St.	5.4	3.1	4.8	0.4	0.9
Cross Section No.7	7.7	1.9	3.1	0.3	0.6
Cross Section No.11	11.0	2.6	3.2	0.3	0.5
Cross Section No.14	13.8	2.9	4.2	0.3	0.6
Union Branch					
Downstream of 10th St.	0.98	2.2	3.8	0.3	0.6
Upstream of N.J. Rt. 37	5.3	2.0	2.7	0.1	0.3
Ridgeway Branch					
Cross Section No.25	2.72	1.7	2.4	0.2	0.4
Cross Section No.27	4.46	1.8	2.9	0.3	0.6
Long Swamp Creek					
Downstream of N.J. Rt. 37	0.44	1.5	2.6	0.4	0.6
Downstream of Lester Dr.	1.67	0.9	2.9	0.1	0.3

(a) Velocity given is the greater of the left and right overbank value

Rates of rise and duration of flooding - Floods generally rise slowly and stay out of the banks for long periods of time. On Toms River, the maximum recorded duration of flooding above critical stage has lasted ninety hours. For selected historic floods and the Standard Project Flood at the U.S.G.S. Gage on Toms River, Table 9 gives the maximum rate of rise (from critical stage level to maximum floodflow level), time of rise (time period corresponding to height of rise), and duration of critical stage (period of time flooding is above critical stage level).

TABLE 9
RATES OF RISE AND DURATION
(U.S.G.S. Gage on Toms River)[a]

Flood	Maximum Rate of Rise ft/hr	Height of Rise ft	Time of Rise hrs	Duration of Critical Stage hrs
September 23, 1938	0.4	4.5	37	90
May 30, 1968	1.0	3.3	16	62
June 13, 1968	0.6	3.2	23	71
July 29, 1969	0.7	3.0	39	88
Standard Project Flood	1.9	10.6	17	114

(a) The gage datum is 8.1 feet, mean sea level datum. The critical stage elevation is 16.1 feet, mean sea level datum.

Photographs, future flood heights - The levels that the Floodway Design Flood, the Flood Hazard Area Design Flood and the Standard Project Flood are expected to reach at various locations along Toms River are indicated on the following photographs.

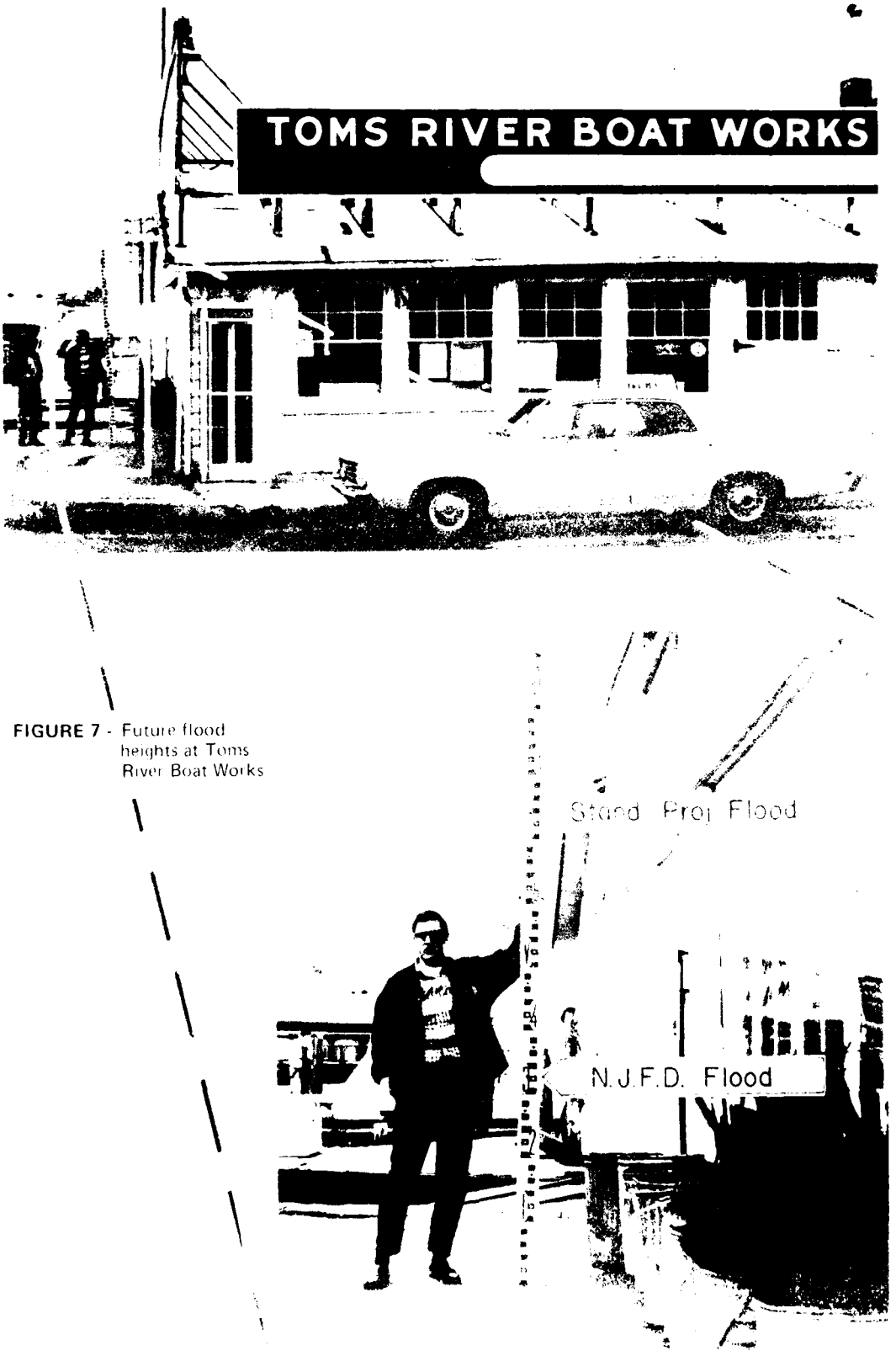


FIGURE 7 - Future flood heights at Toms River Boat Works

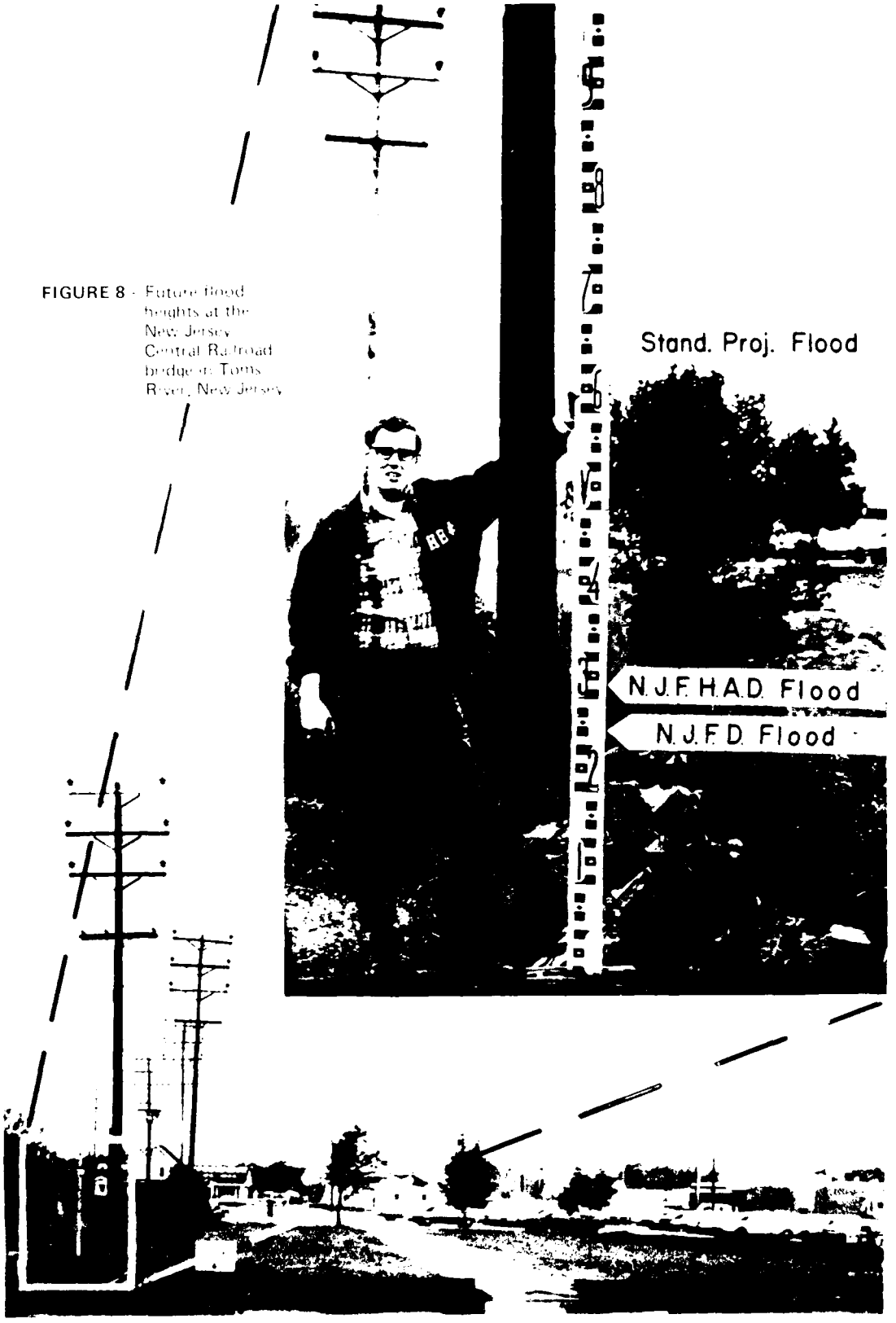


FIGURE 8 - Future flood heights at the New Jersey Central Railroad bridge on Toms River, New Jersey

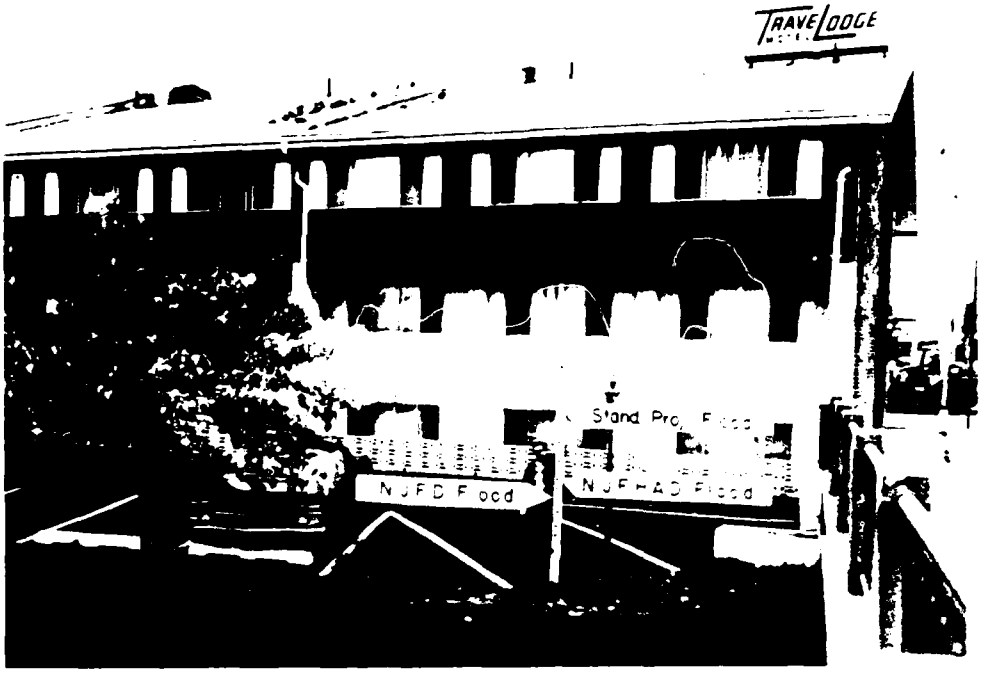


FIGURE 9 - Future flood heights at the Travel Lodge Motel in Toms River, New Jersey

FIGURE 10 - Future flood heights at Brook Road along Union Branch

GLOSSARY

Backwater. The resulting high water surface in a given stream due to a downstream obstruction or high stages in an intersecting stream.

Flood. An overflow of lands not normally covered by water and that are used or usuable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river, stream, ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in streamflow or stage, but not the ponding of surface water, the results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased streamflow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Hazard Area Design Flood. A flood greater than the Floodway Design Flood that inundates the Floodway and additional portions of the flood plain. This area is known as the Flood Hazard Area. The Floodway (see Floodway Design Flood) is an integral part of the Flood Hazard Area. This flood is also used extensively by the State of New Jersey for planning purposes.

Flood Plain. The areas adjoining a river, stream, watercourse, ocean, lake, or other body of standing water that have been or may be covered by floodwater.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Floodway Design Flood. A flood that inundates the channel and portions of the adjacent flood plain necessary for the reasonable passage of flood waters. This area is known as the Floodway and represents the minimum area of the flood plain required for passage of flood waters without aggravating flood conditions upstream or downstream. This flood is used extensively by the State of New Jersey for planning purposes. In the hydrologic region which includes the Toms River watershed, the Floodway Design Flood has an average frequency of occurrence of once in 100 years. (See also: Flood Hazard Area Design Flood).

Hurricane. An intense cyclonic windstorm of tropical origin in which winds tend to spiral inward in a counterclockwise direction toward a core of low pressure, with maximum surface wind velocities that equal or exceed 75 miles per hour (65 knots) for several minutes or longer at some points. Tropical storm is the term applied if maximum winds are less than 75 miles per hour.

Hydrograph. A graph showing flow values against time at a given point, usually measured in cubic feet per second. The area under the curve indicates total volume of flow.

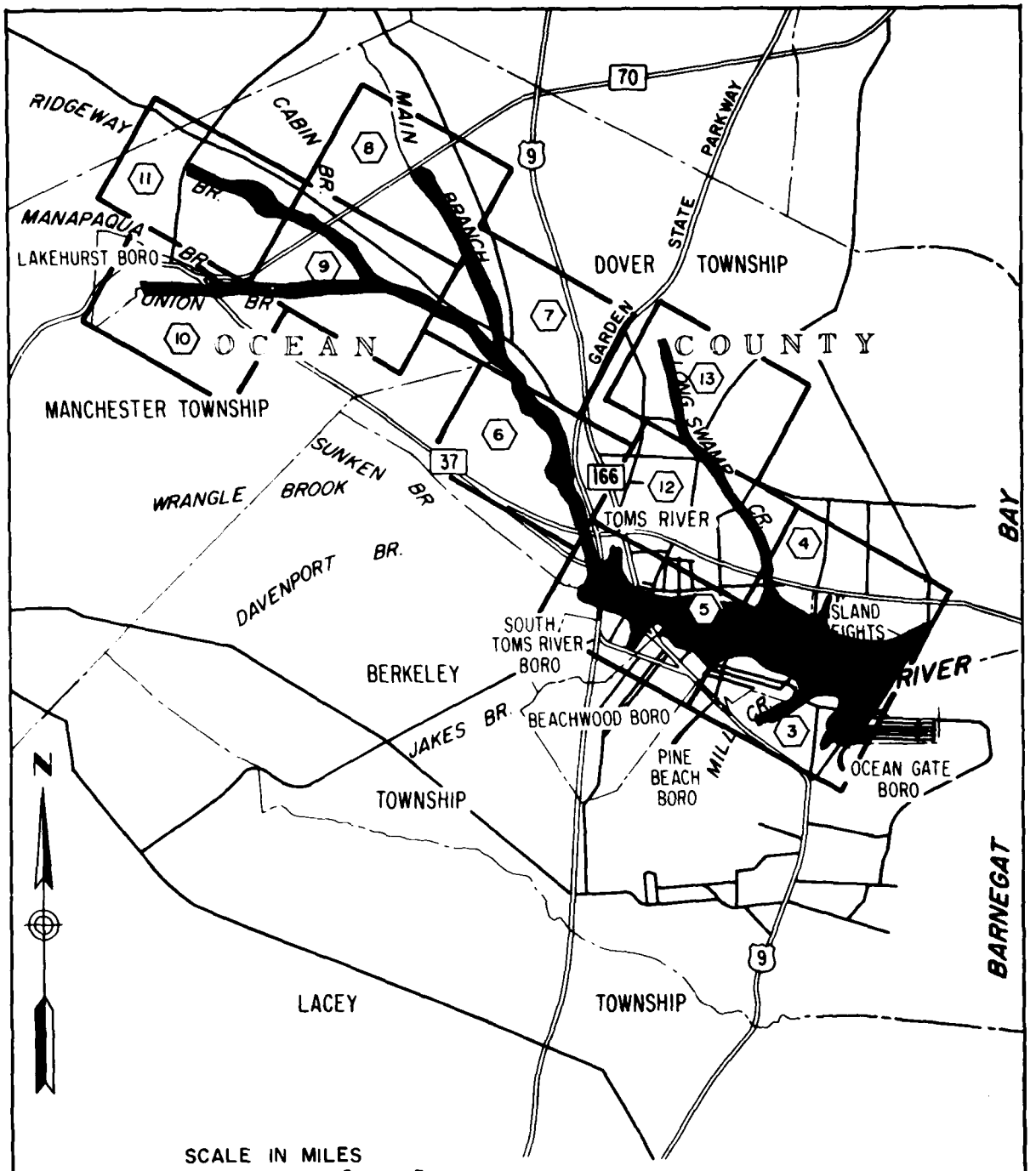
Intermediate Regional Tide. A high tide having a frequency of occurrence in the order of once in 100-years, although the tide may occur in any year. The tide elevation is based on statistical analyses of tide records applicable to the study area.

Left Bank. The bank on the left side of a river, stream, or watercourse, looking downstream.

Right Bank. The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40-60 percent of the Probable Maximum Floods for the same basins. As used by the Corps of Engineers, Standard Project Floods are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance Elevation. The elevation at the top of the opening of a culvert, or other structure through which water may flow along a watercourse.



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

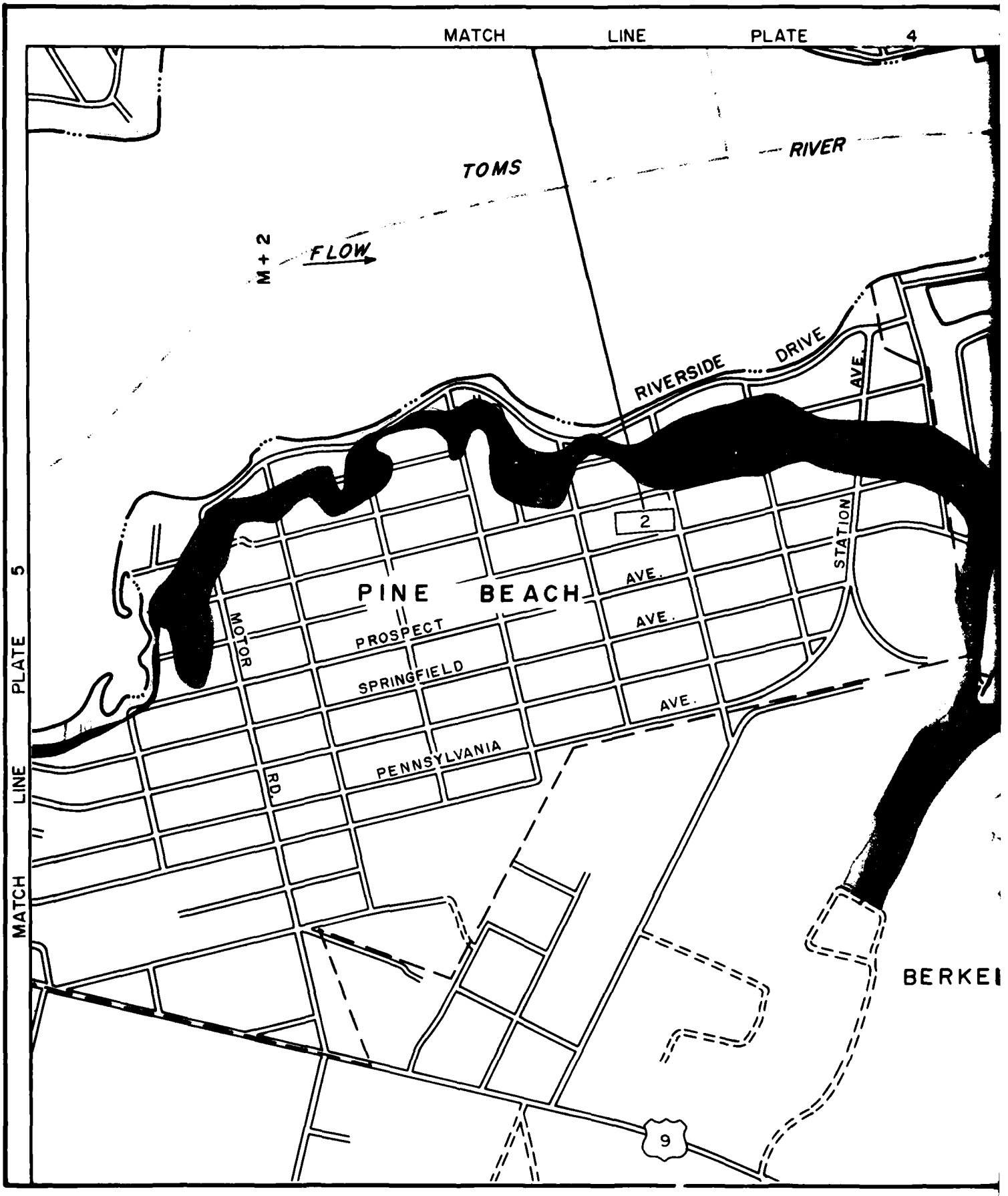
FLOOD PLAIN INFORMATION

TOMS RIVER
OCEAN COUNTY, N.J.

INDEX MAP - FLOODED AREA

JUNE 1972

PLATE 2


MATCH LINE PLATE 4
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STATION
PINE BEACH
AVE.
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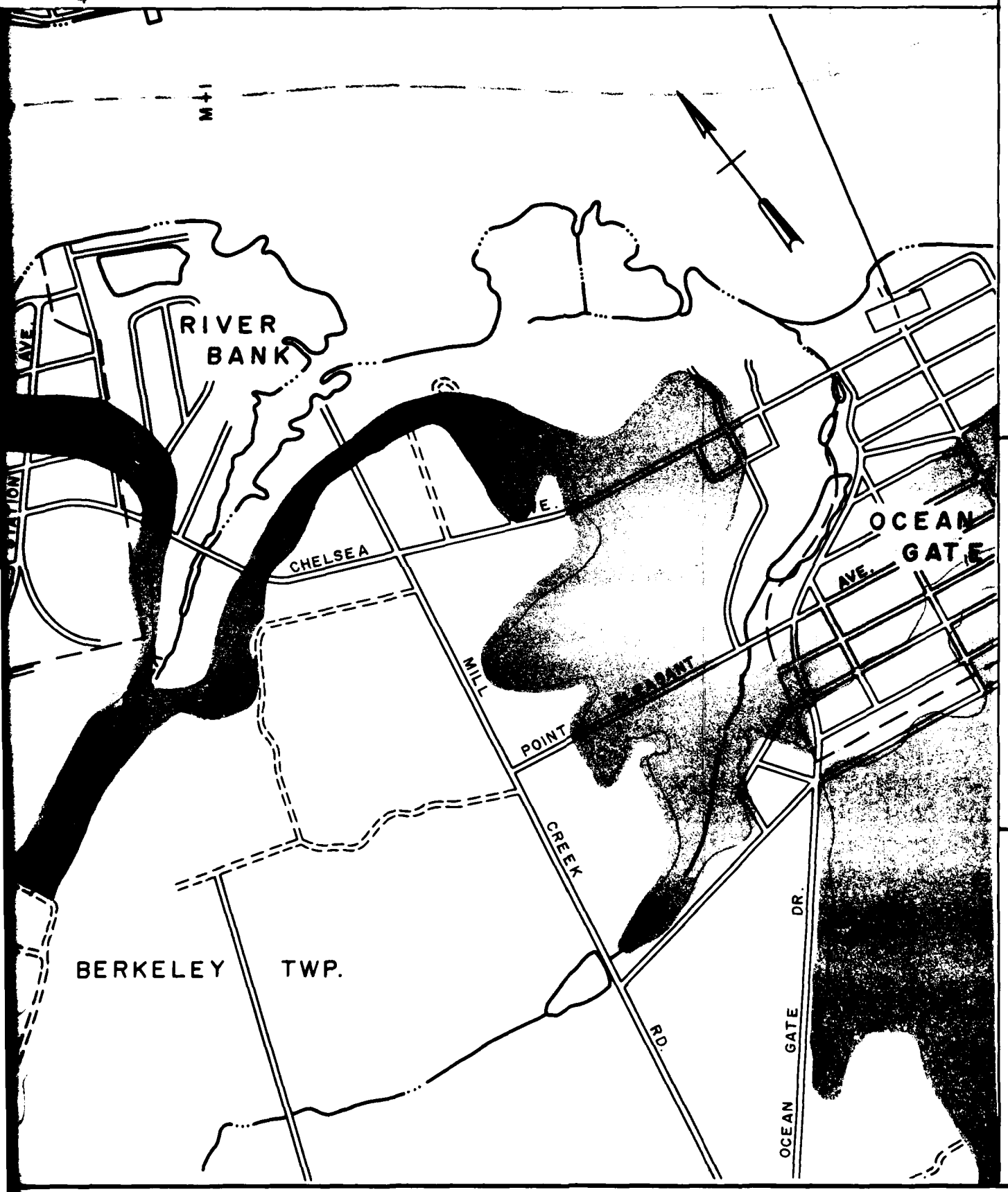
AVE.
MOTOR
PROSPECT
SPRINGFIELD
PENNSYLVANIA
RD.
MATCH LINE PLATE 5
BERKEL
9



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OVERFLOW LIMITS

100 YEAR TIDE — STANDARD PROJECT TIDE

M + 1 — MILES ABOVE MOUTH

2 — CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

TOWNSHIP OR BORO LIMITS

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET TOMS RIVER, N.J., 1953. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

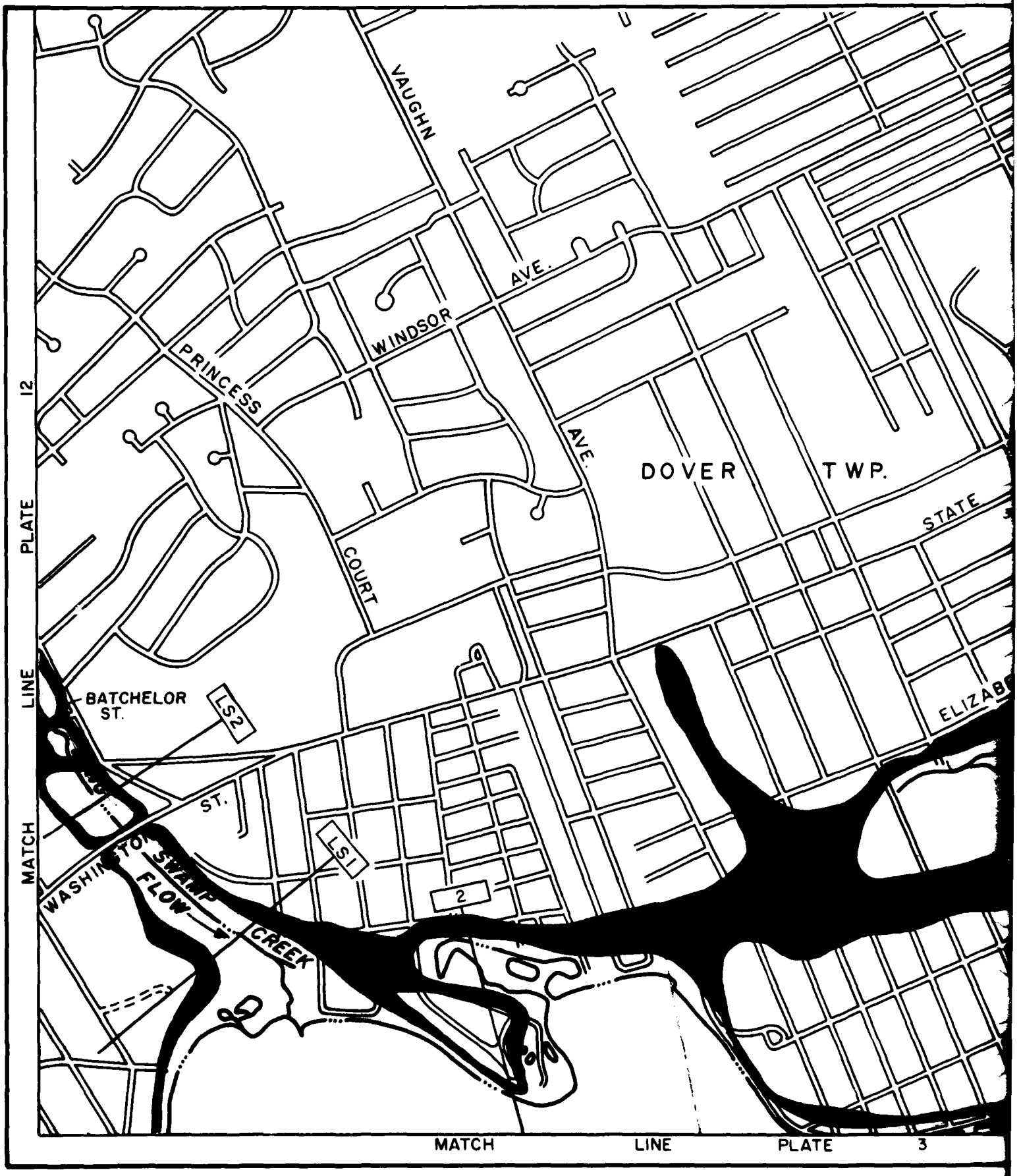
FLOOD PLAIN INFORMATION

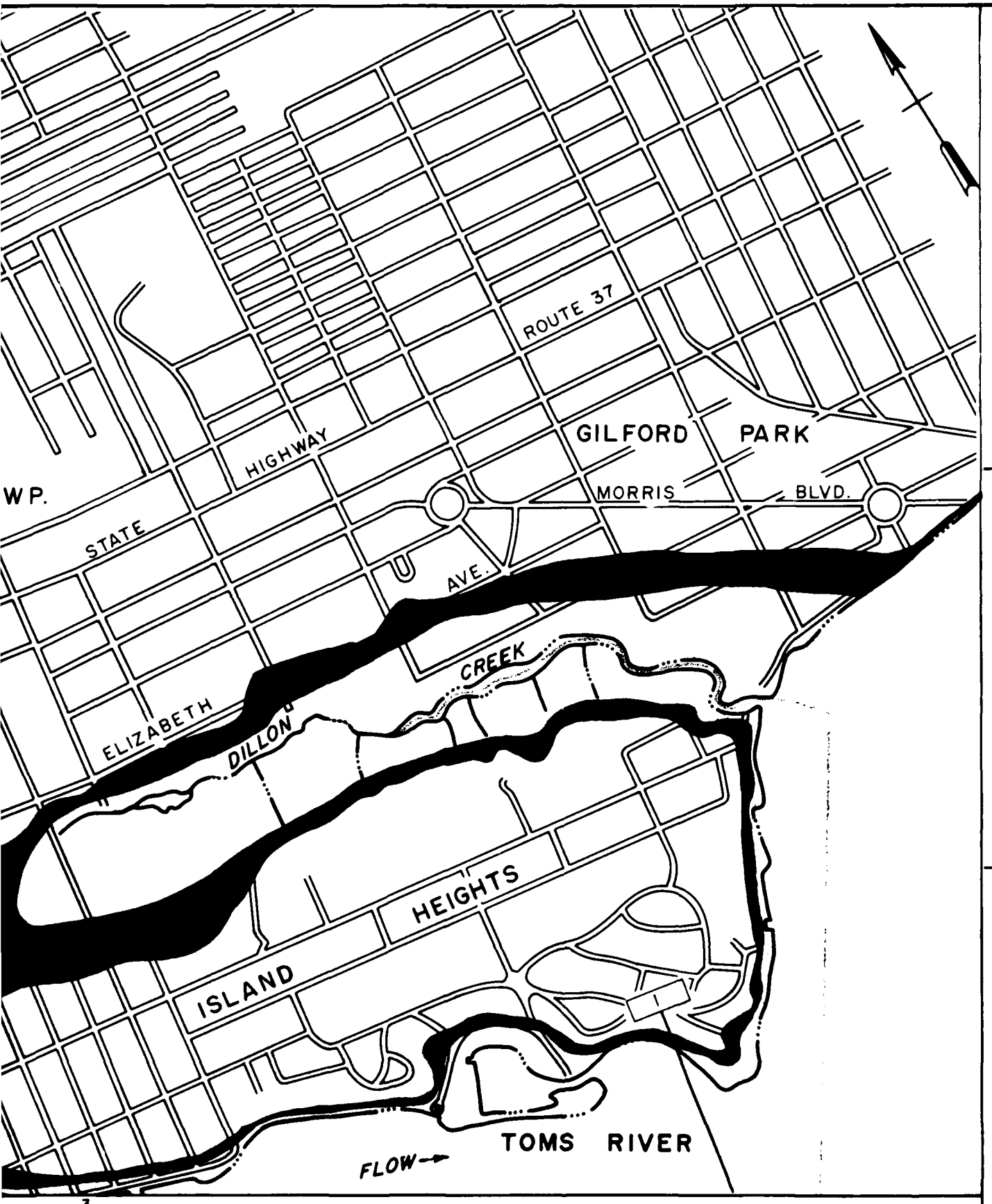
TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 3


VAUGHN
AVE.
WINDSOR
PRINCESS
AVE.
DOVER TWP.
STATE
COURT
BATCHELOR ST.
LS2
ST.
LS1
2
WASHINGTON
SWAMP
FLOW
CREEK
ELIZABE
MATCH LINE PLATE 12
MATCH LINE PLATE 3



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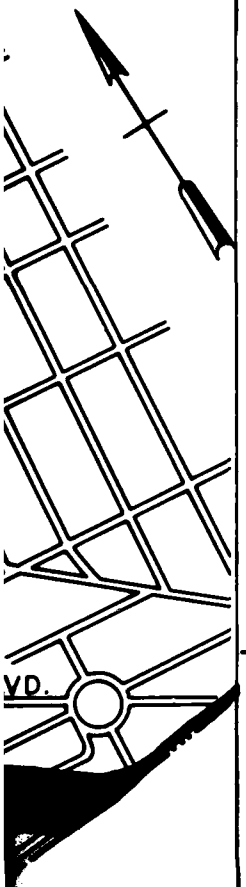

LEGEND

OVERFLOW LIMITS

100 YEAR TIDE — STANDARD PROJECT TIDE

LS 1 — CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C.& G.S. 1929 ADJ.) SEA LEVEL DATUM

TOWNSHIP OR BORO LIMITS

CHANNEL

NOTES

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SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

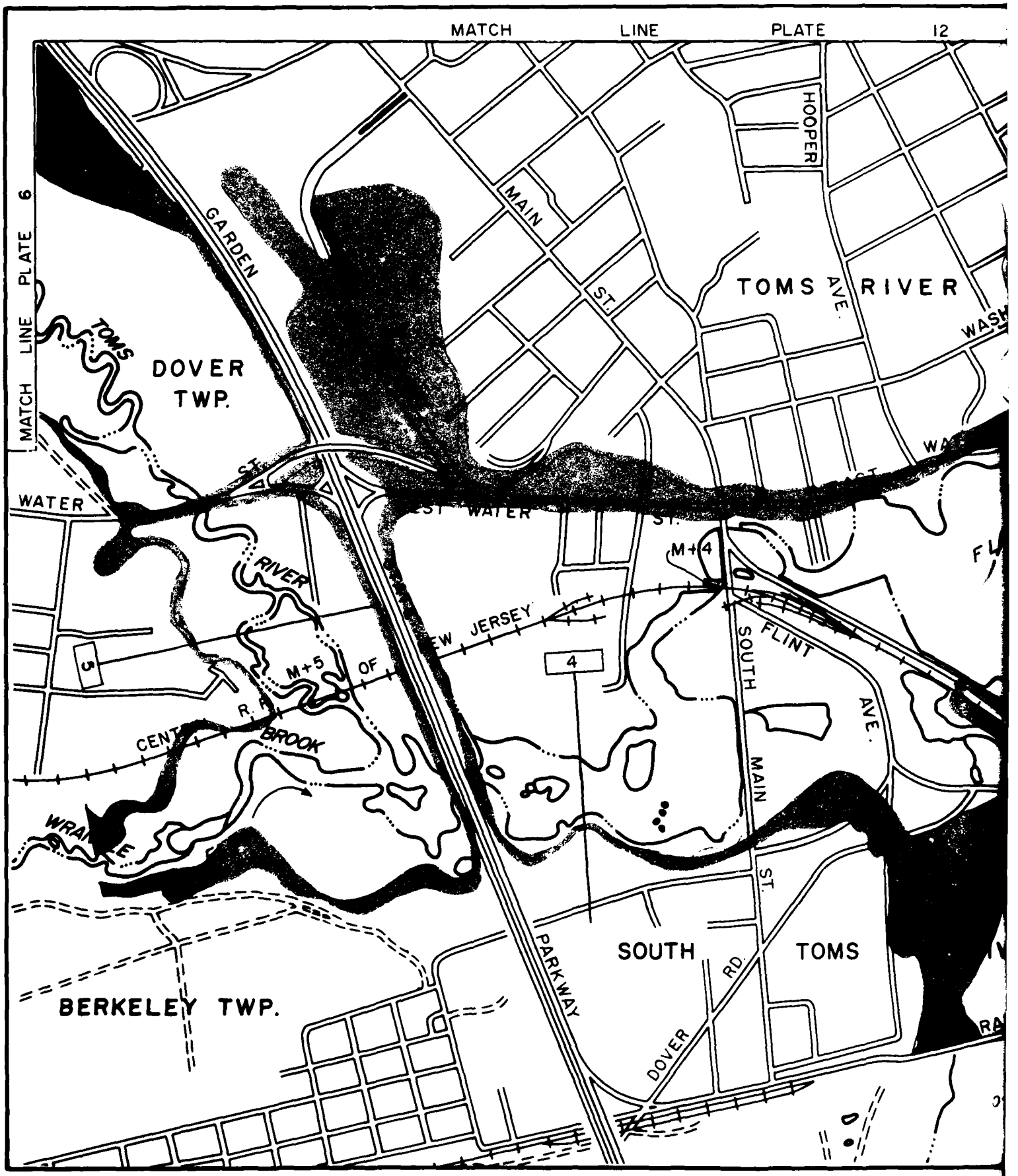
FLOOD PLAIN INFORMATION

TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 4


MATCH LINE PLATE 12
MATCH LINE PLATE 6
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TOMS
DOVER TWP.
WATER
ST.
RIVER
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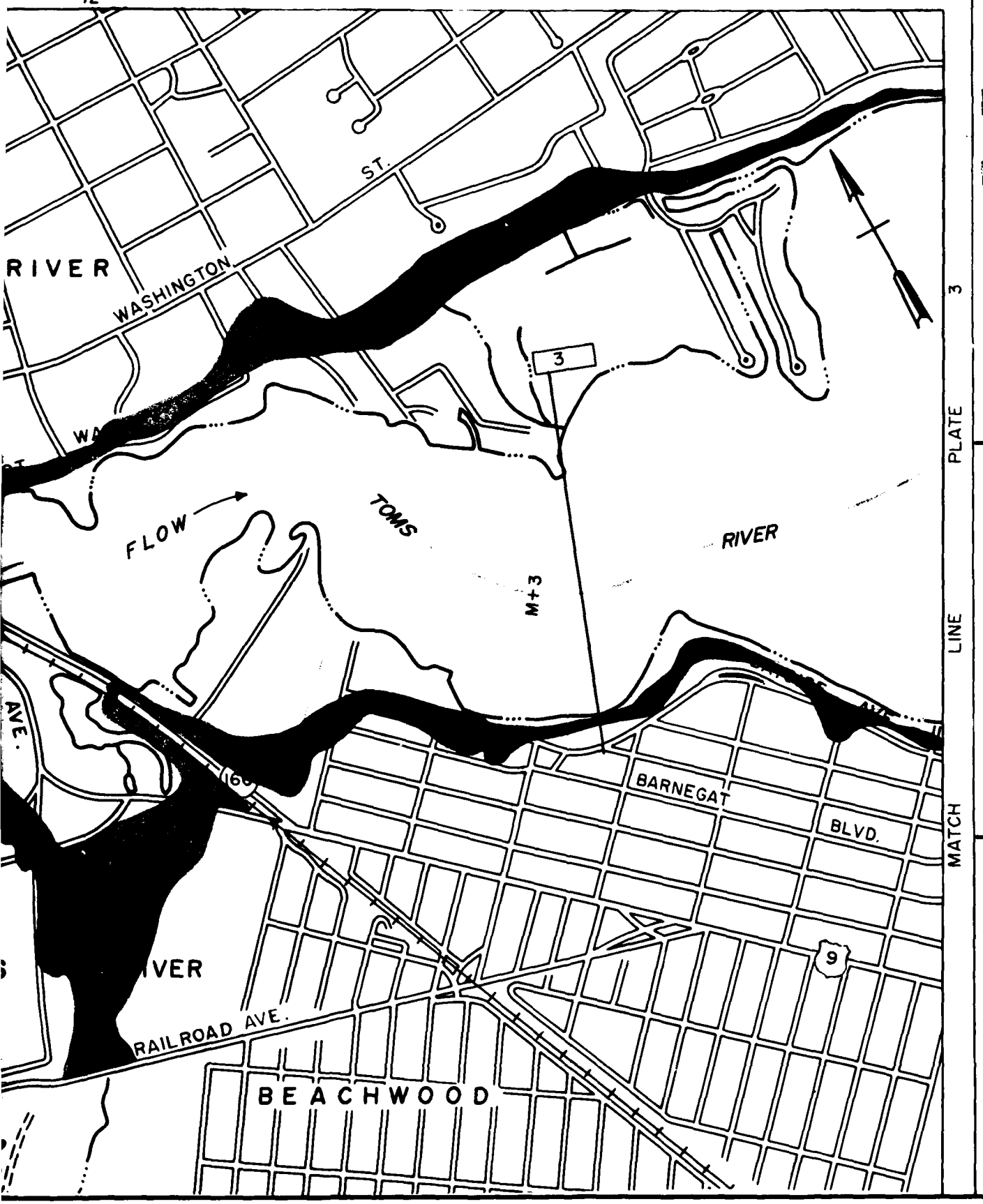
NEW JERSEY
FLINT
SOUTH
AVE.
MAIN
ST.
5
4
M+5
OF
BROOK
PARKWAY
SOUTH TOMS
RD.
DOVER
BERKELEY TWP.



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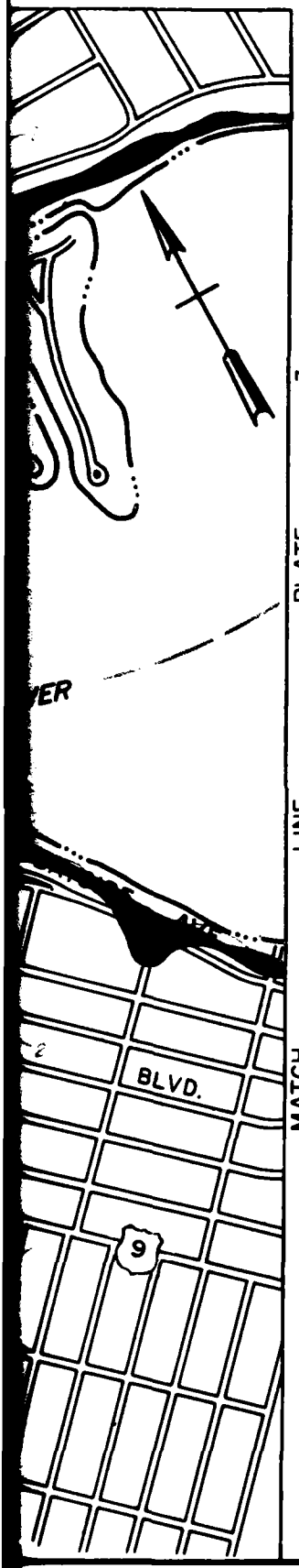

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD (100 YR. TIDE) / N.J. FLOOD HAZARD AREA DESIGN FLOOD — STANDARD PROJECT FLOOD (TIDE)

M + 3 — MILES ABOVE MOUTH

4 — CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C.& G.S. 1929 ADJ.) SEA LEVEL DATUM

TOWNSHIP OR BORO LIMITS

CHANNEL

NOTES

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SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

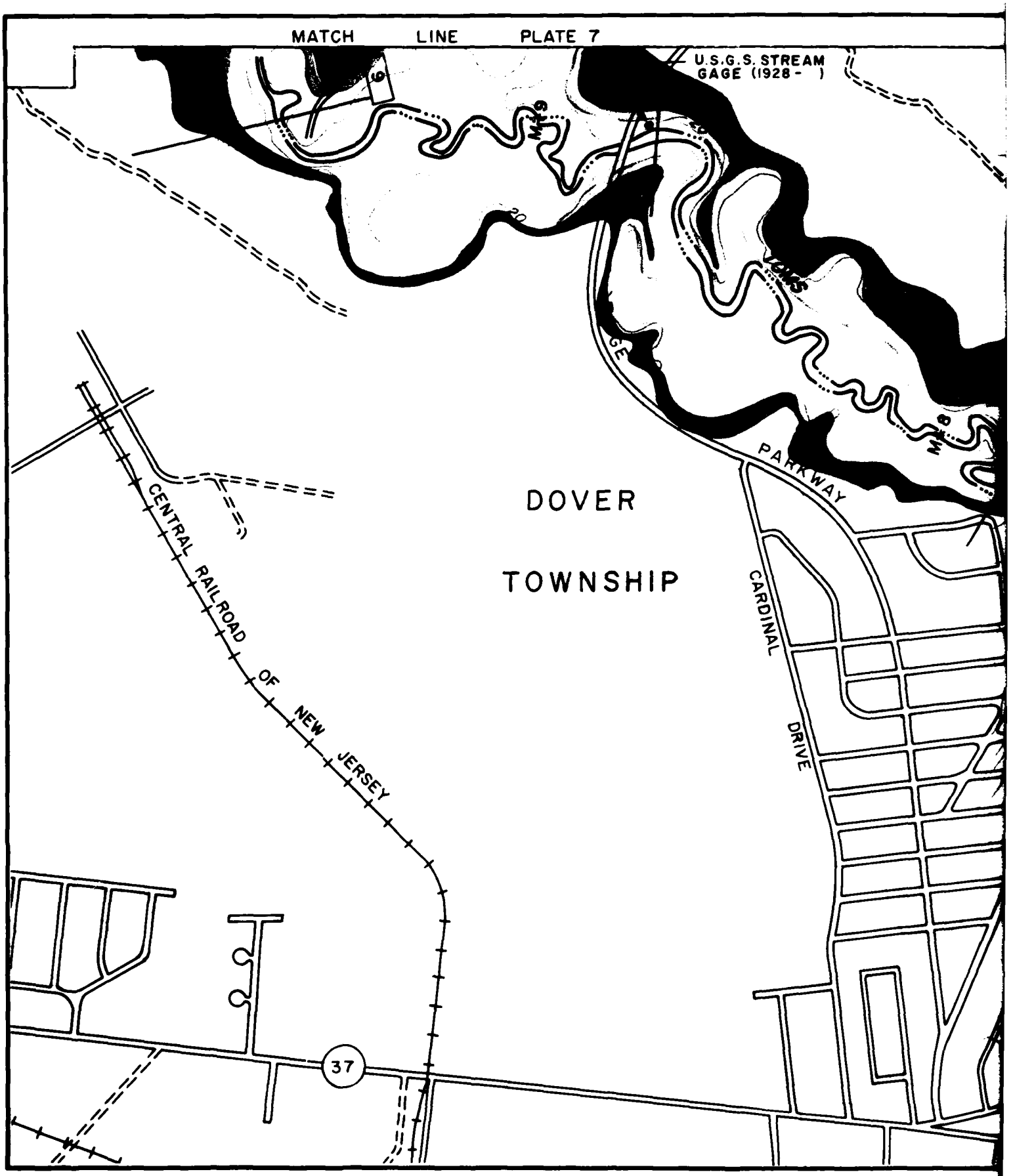
FLOOD PLAIN INFORMATION

TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 5


MATCH LINE PLATE 7
U.S.G.S. STREAM GAGE (1928 -)
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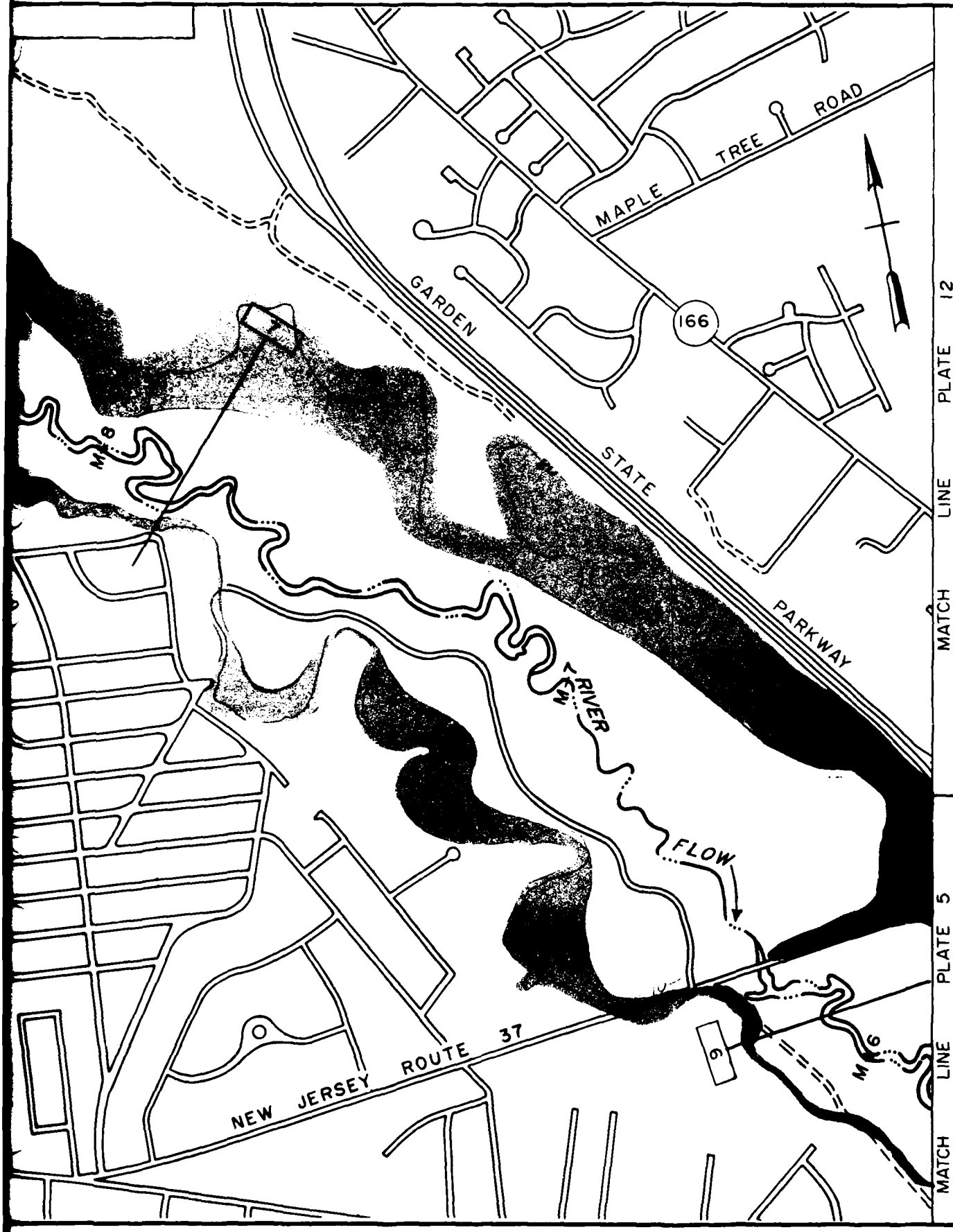
TOWNSHIP
CENTRAL RAILROAD OF NEW JERSEY
CARDINAL DRIVE
PARKWAY
37



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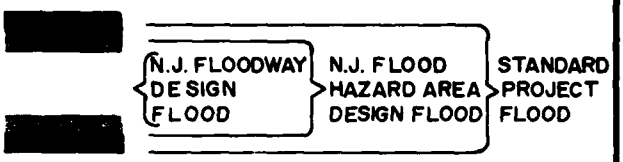
OVERFLOW LIMITS



M+7 MILES ABOVE MOUTH

7 CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C.& G.S. 1929 ADJ.) SEA LEVEL DATUM

CHANNEL

NOTES

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MATCH LINE PLATE 5

SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

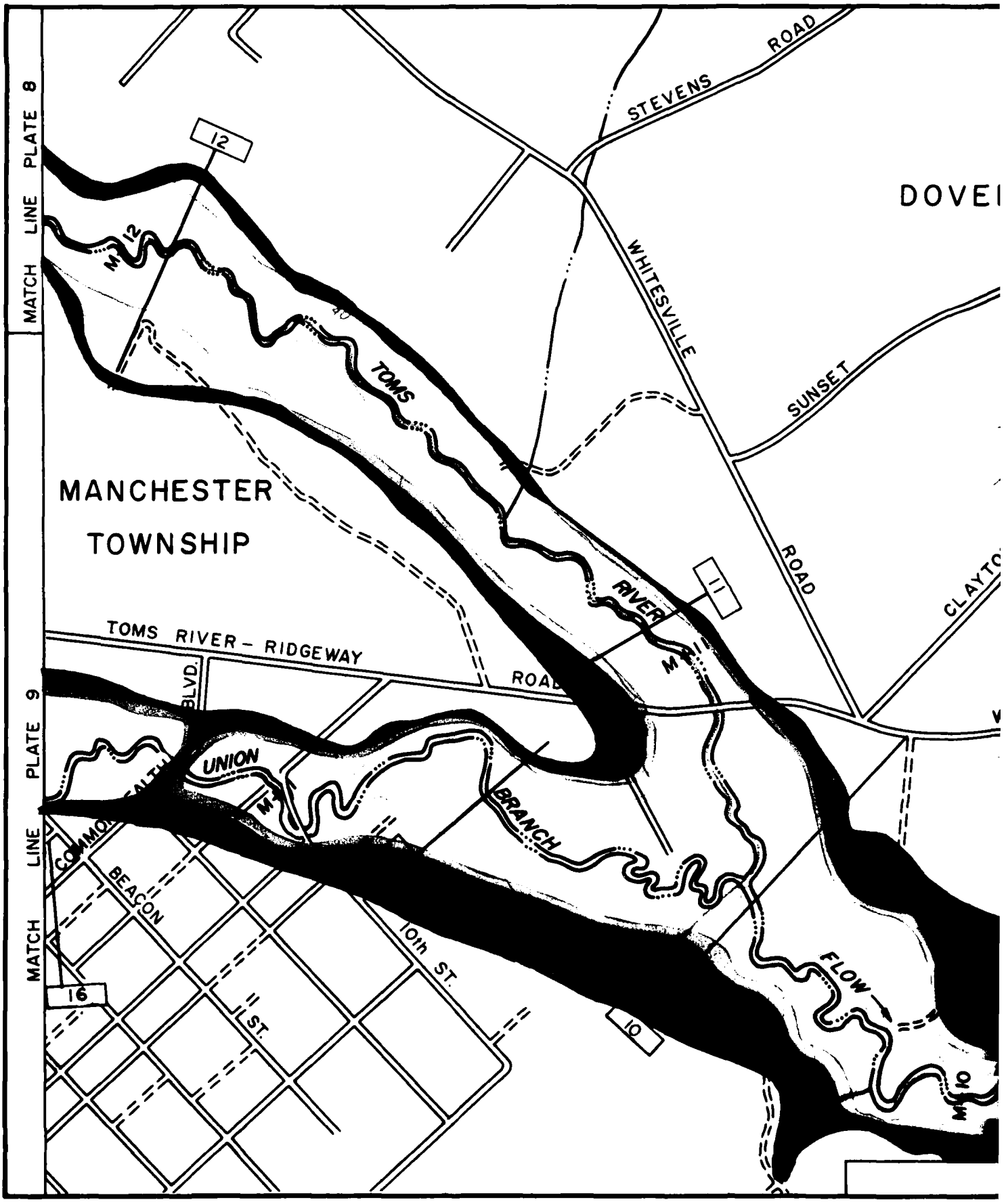
FLOOD PLAIN INFORMATION

TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 6


MATCH LINE PLATE 8
MATCH LINE PLATE 9
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MANCHESTER
TOWNSHIP
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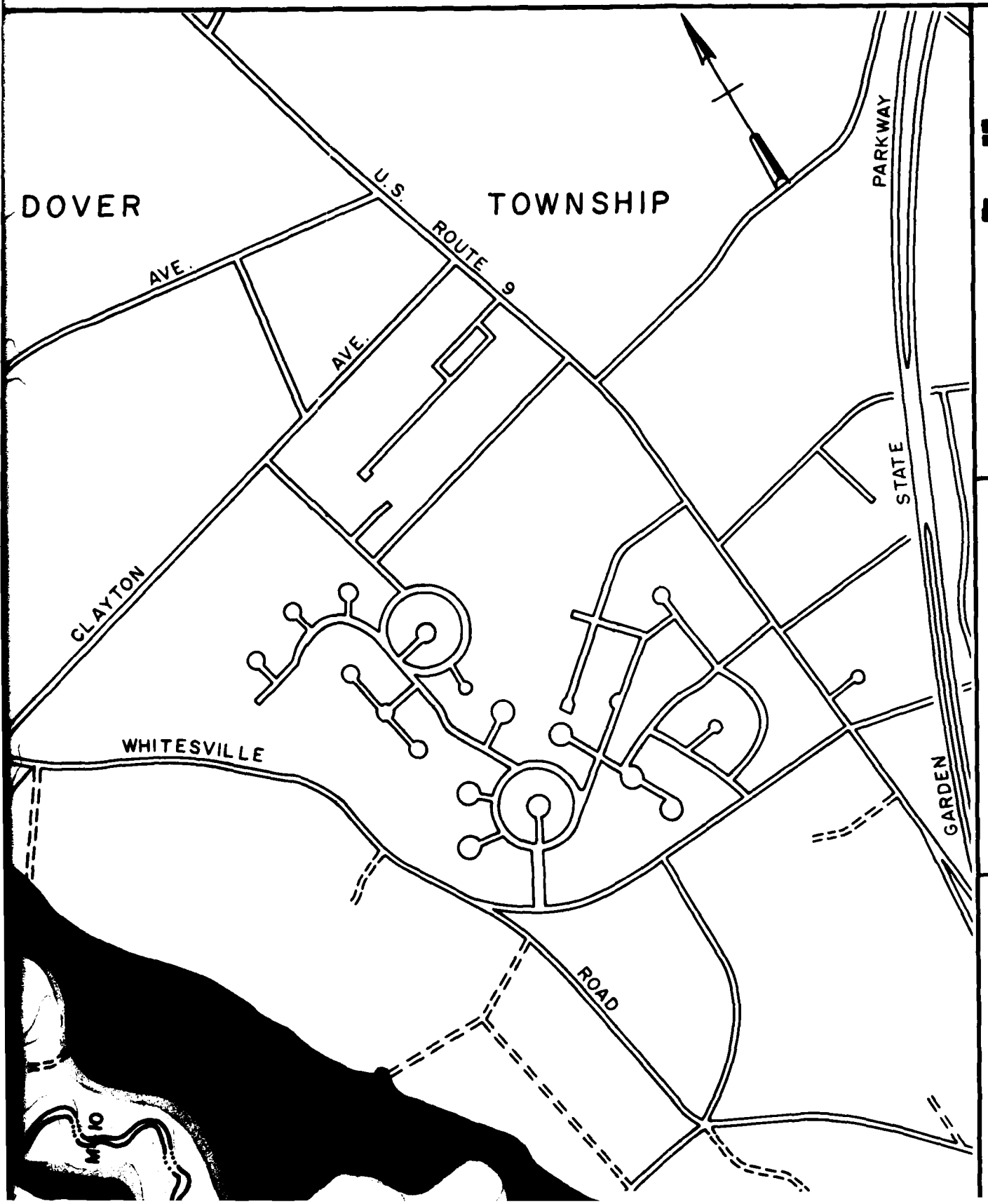

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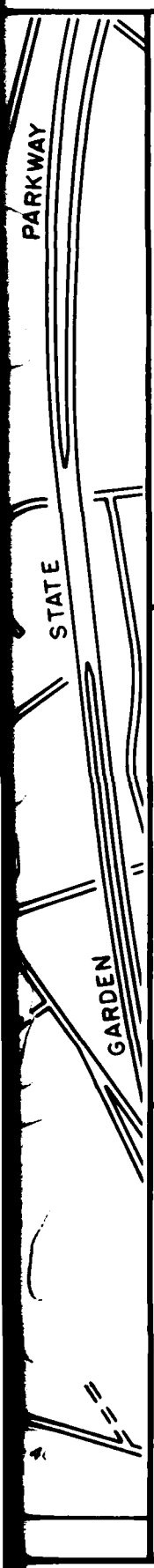

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD | N.J. FLOOD HAZARD AREA DESIGN FLOOD | STANDARD PROJECT FLOOD

M+11 MILES ABOVE MOUTH

11 CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

TOWNSHIP OR BORO LIMITS

CHANNEL

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET LAKEWOOD, N.J., 1954 & TOMS RIVER, N.J., 1953. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
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SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

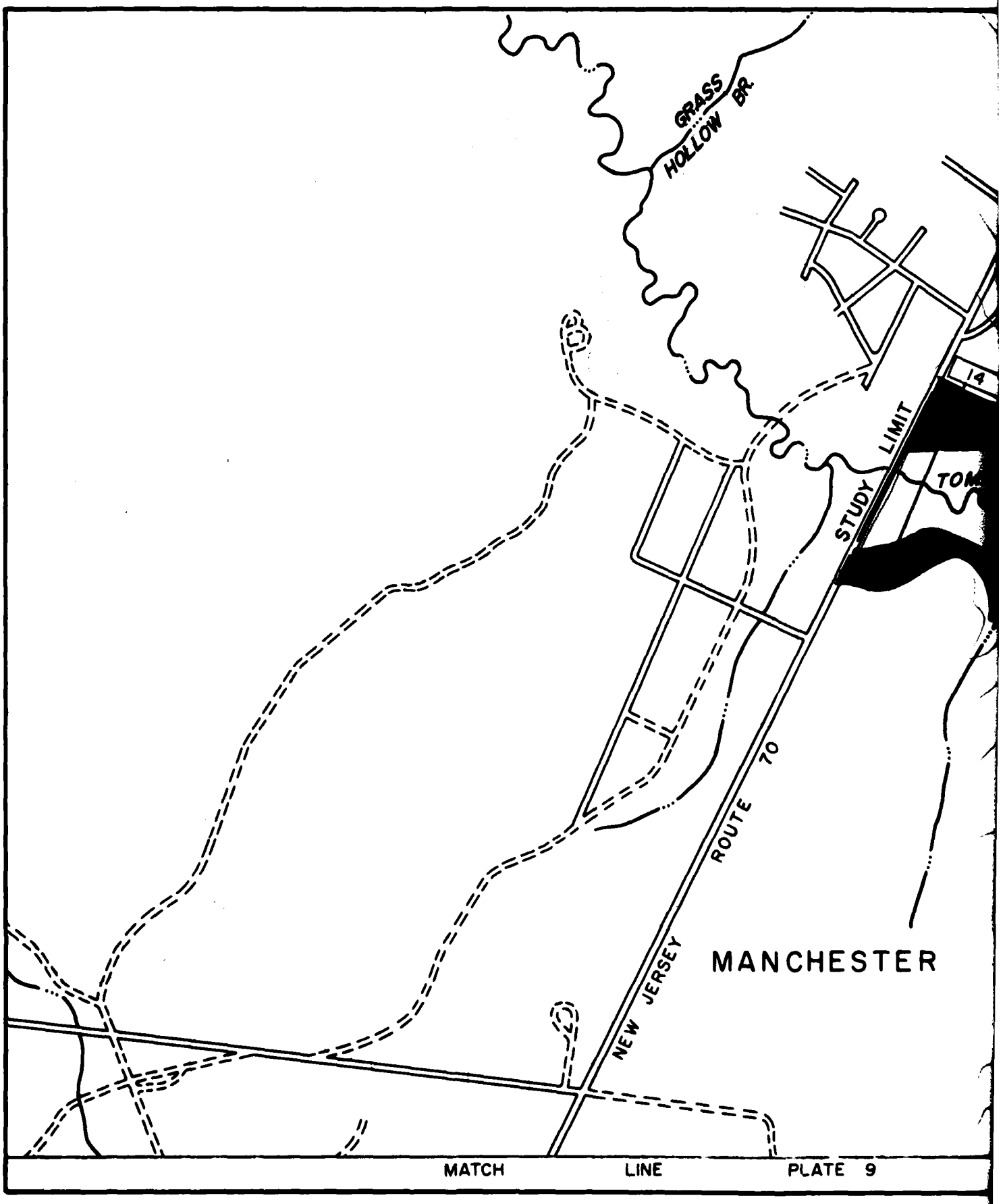
FLOOD PLAIN INFORMATION

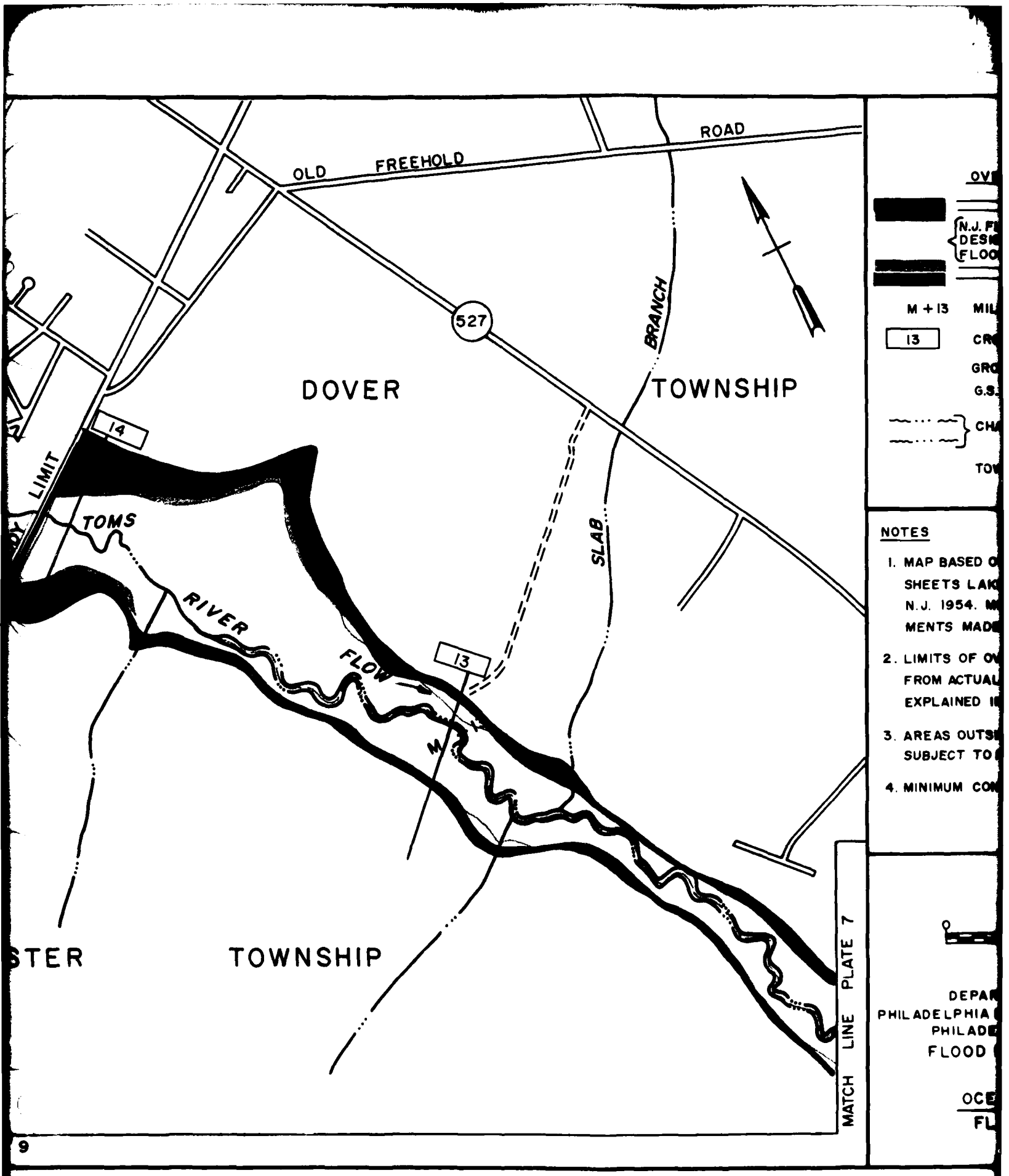
TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 7


GRASS HOLLOW BR.
14
STUDY LIMIT
NEW JERSEY ROUTE 70
MANCHESTER
MATCH LINE PLATE 9


OLD FREEHOLD ROAD
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BRANCH
DOVER TOWNSHIP
14
LIMIT
TOMS
RIVER
FLOW
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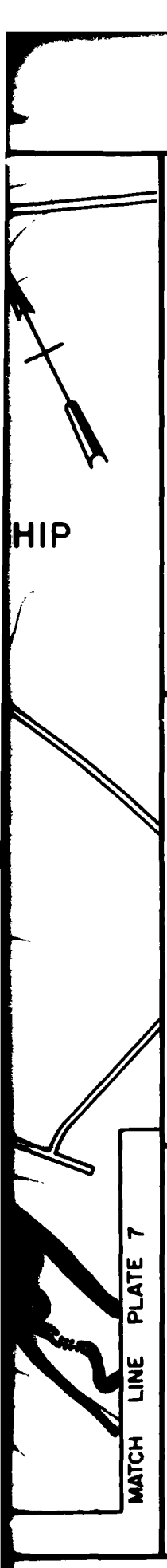


LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD | N.J. FLOOD HAZARD AREA DESIGN FLOOD | STANDARD PROJECT FLOOD

M + 13 MILES ABOVE MOUTH

13 CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

CHANNEL

TOWNSHIP OR BORO LIMITS

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEETS LAKEHURST, N.J., 1957 & LAKEWOOD, N.J. 1954. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM CONTOUR INTERVAL IS 10 FT

SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

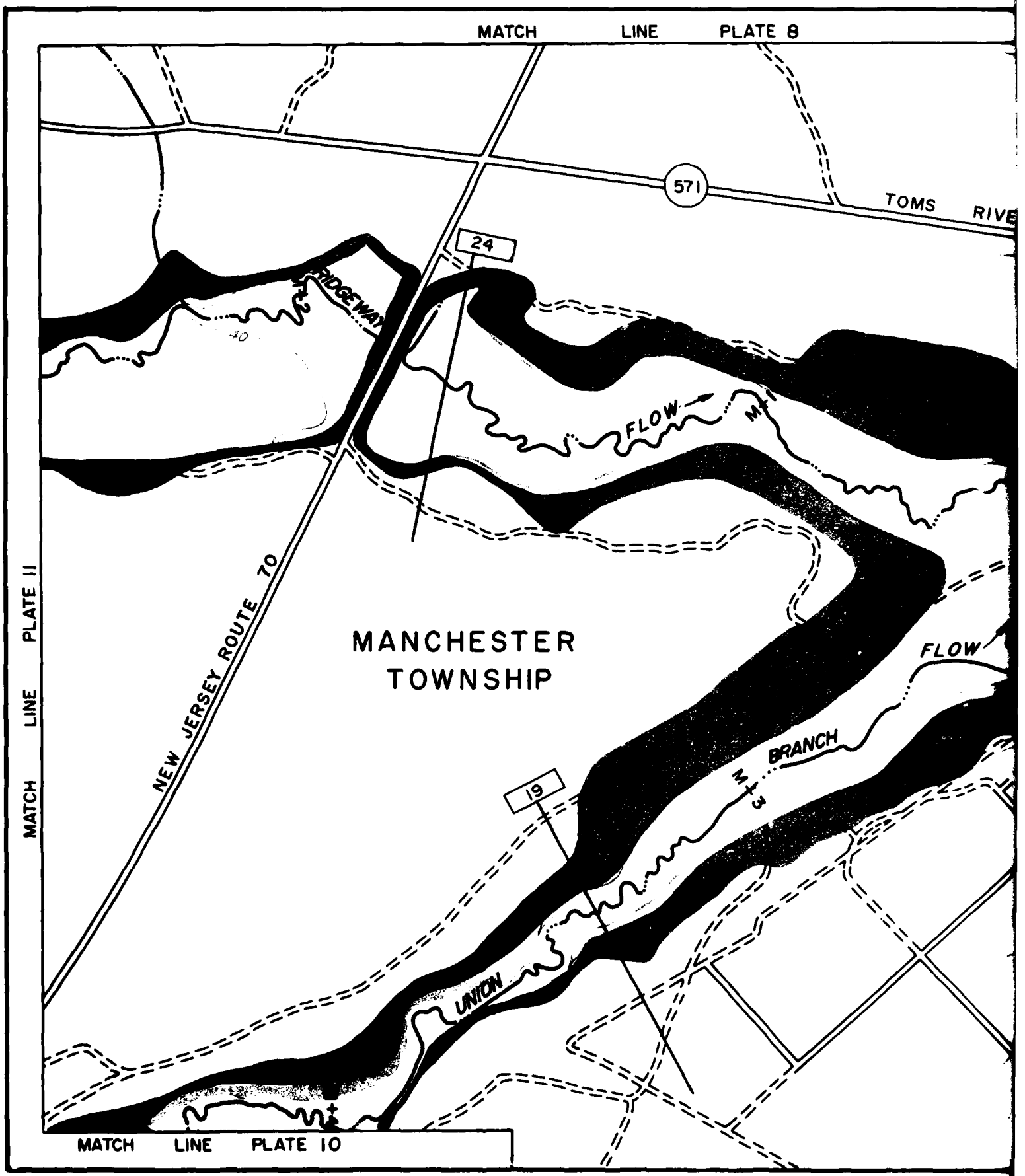
FLOOD PLAIN INFORMATION

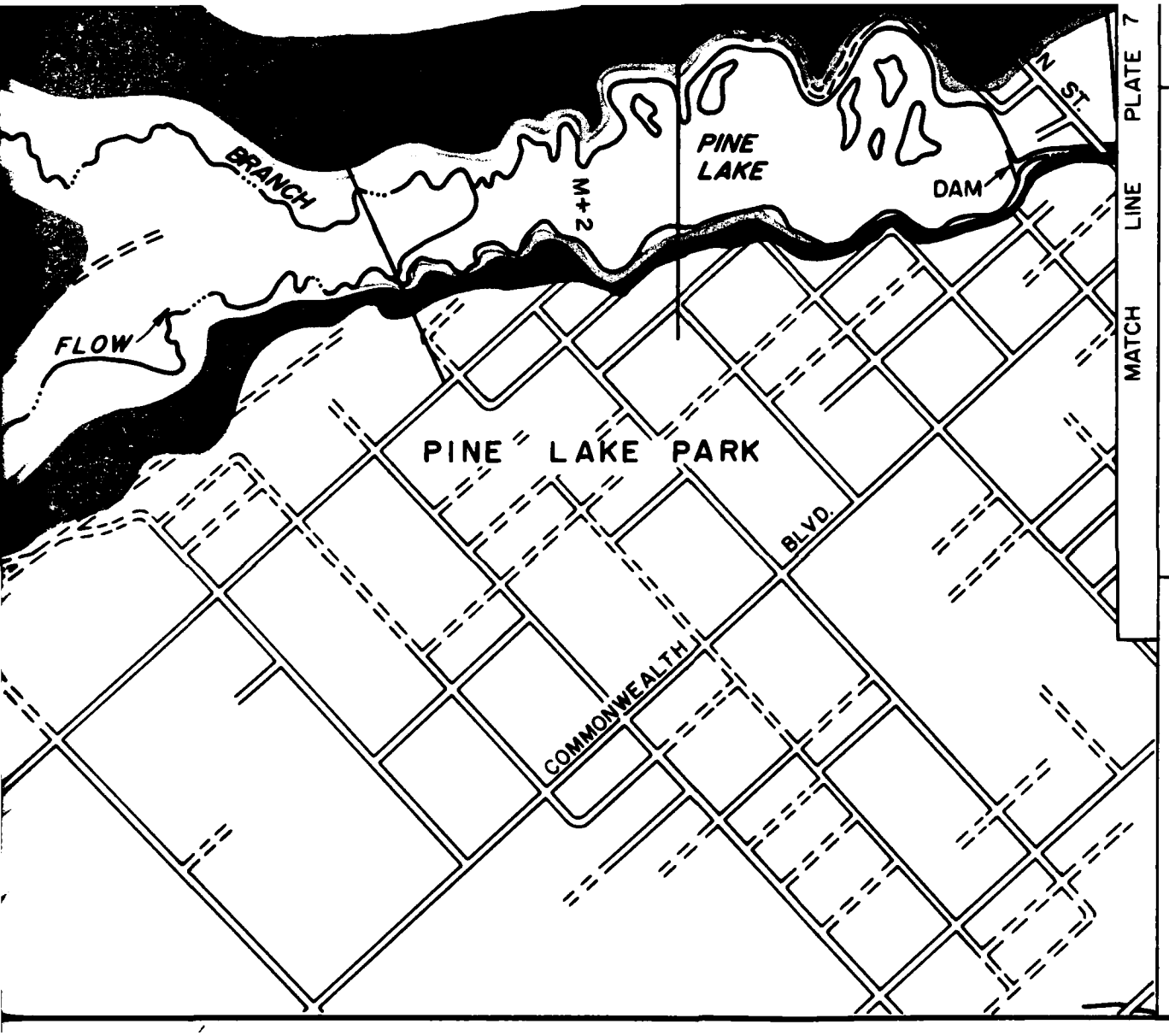
TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 8


MATCH LINE PLATE 8
571
TOMS RIVE
24
RIDGE WAY
FLOW
MANCHESTER
TOWNSHIP
NEW JERSEY ROUTE 70
MATCH LINE PLATE 11
FLOW
BRANCH
19
UNION
MATCH LINE PLATE 10



NOTES

1. MAP BASED ON U.
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N.J. 1954. MINOR
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2. LIMITS OF OVERF
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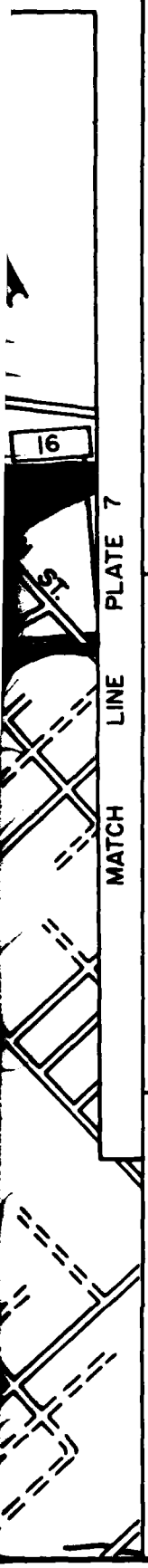

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD | N.J. FLOOD HAZARD AREA DESIGN FLOOD | STANDARD PROJECT FLOOD

M + 3 MILES ABOVE MOUTH

17 CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C.& G.S. 1929 ADJ.) SEA LEVEL DATUM

STREAM CENTERLINE

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET LAKEHURST, N.J., 1957 & LAKEWOOD N.J. 1954. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
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3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

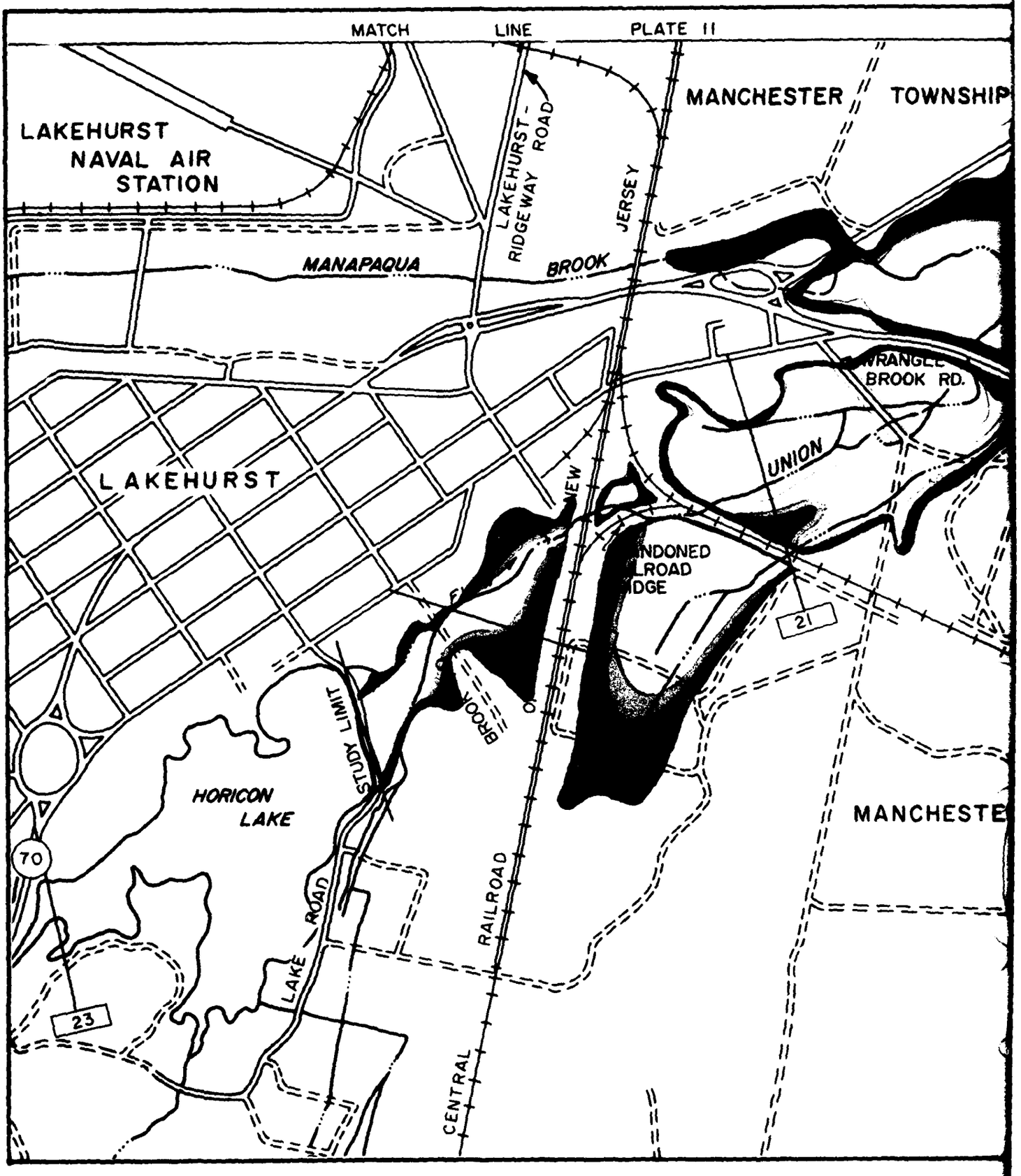
FLOOD PLAIN INFORMATION

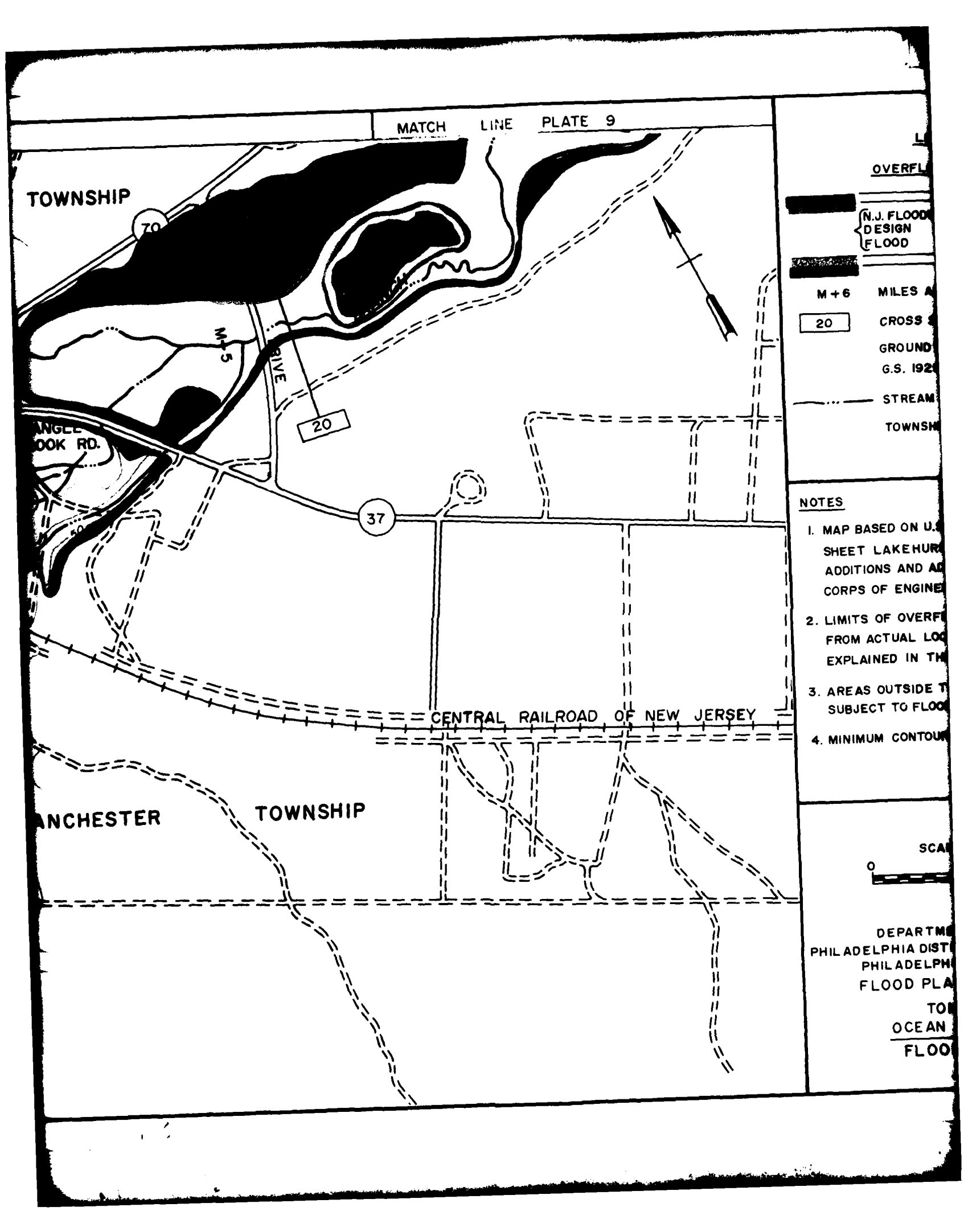
TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 9


MATCH LINE PLATE 11
MANCHESTER TOWNSHIP
LAKEHURST NAVAL AIR STATION
LAKEHURST-RIDGEWAY ROAD
JERSEY
MANAPAQUA BROOK
BROOK RD.
UNION
LAKEHURST
INDONED
LROAD
IDGE
21
STUDY LIMIT
HORICON LAKE
MANCHESTE
70
LAKE ROAD
RAILROAD
23
CENTRAL


MATCH LINE PLATE 9
TOWNSHIP
70
M+5
RIVE
20
OOK RD.
37
CENTRAL RAILROAD OF NEW JERSEY
ANCHESTER TOWNSHIP
OVERFL
N.J. FLOOD
DESIGN
FLOOD
M+6
MILES A
20
CROSS
GROUND
G.S. 192
STREAM
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NOTES
1. MAP BASED ON U.
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CORPS OF ENGINE
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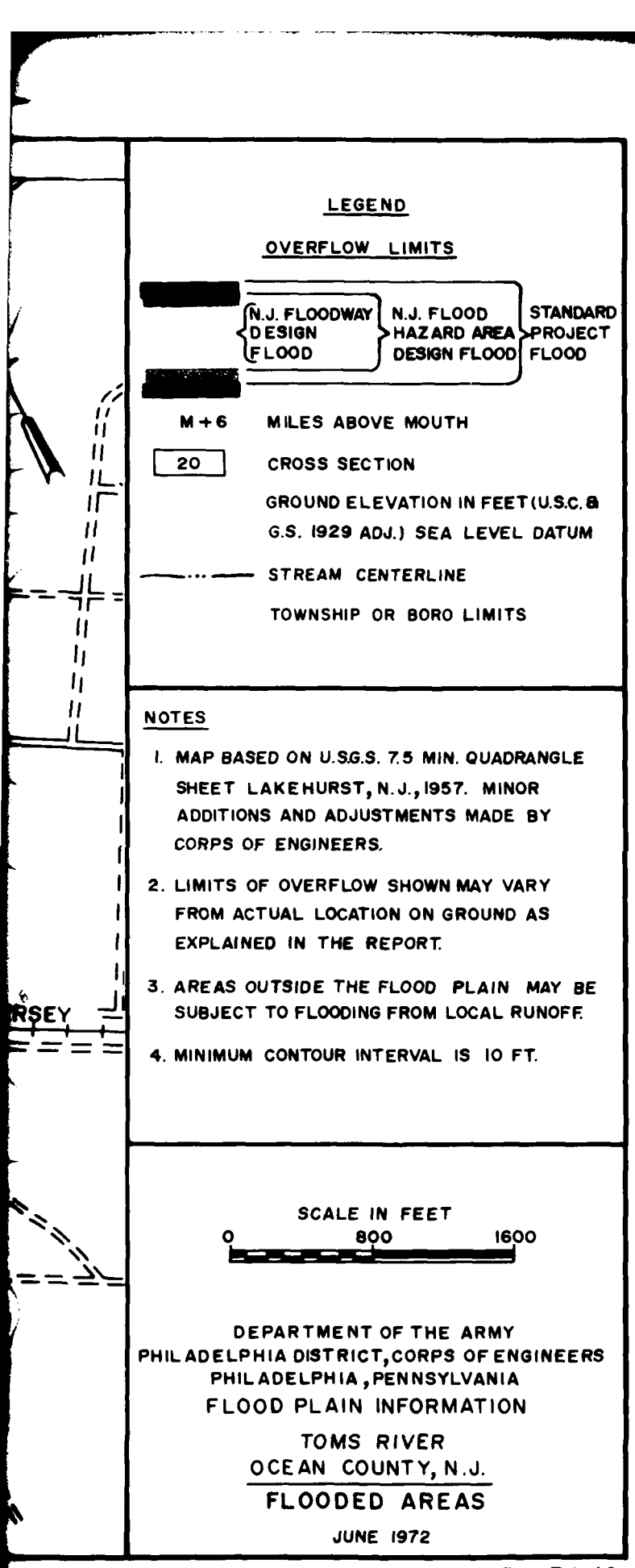

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD | N.J. FLOOD HAZARD AREA DESIGN FLOOD | STANDARD PROJECT FLOOD

M+6 — MILES ABOVE MOUTH

20 — CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C.& G.S. 1929 ADJ.) SEA LEVEL DATUM

STREAM CENTERLINE

TOWNSHIP OR BORO LIMITS

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET LAKEHURST, N.J., 1957. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
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4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

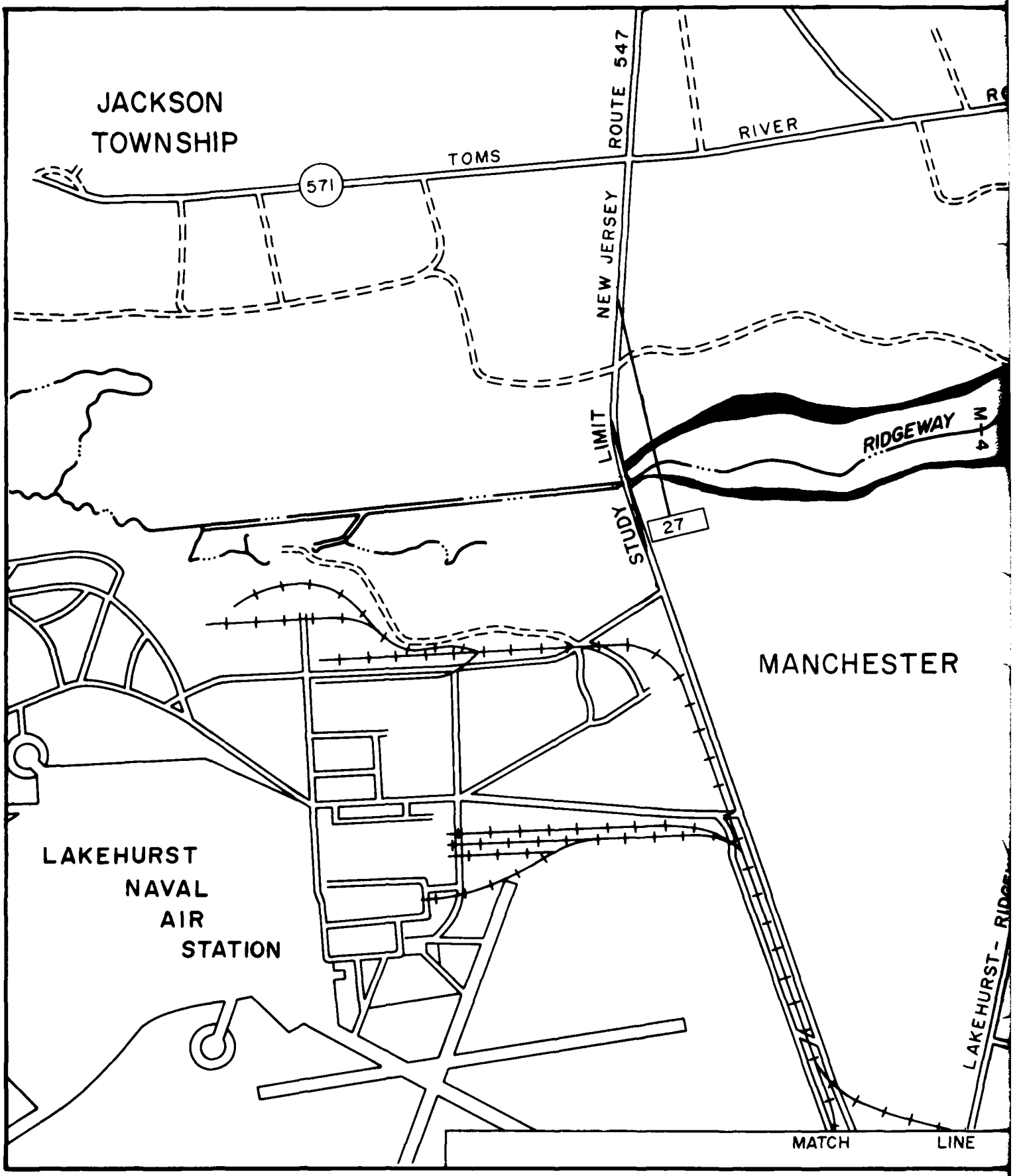
FLOOD PLAIN INFORMATION

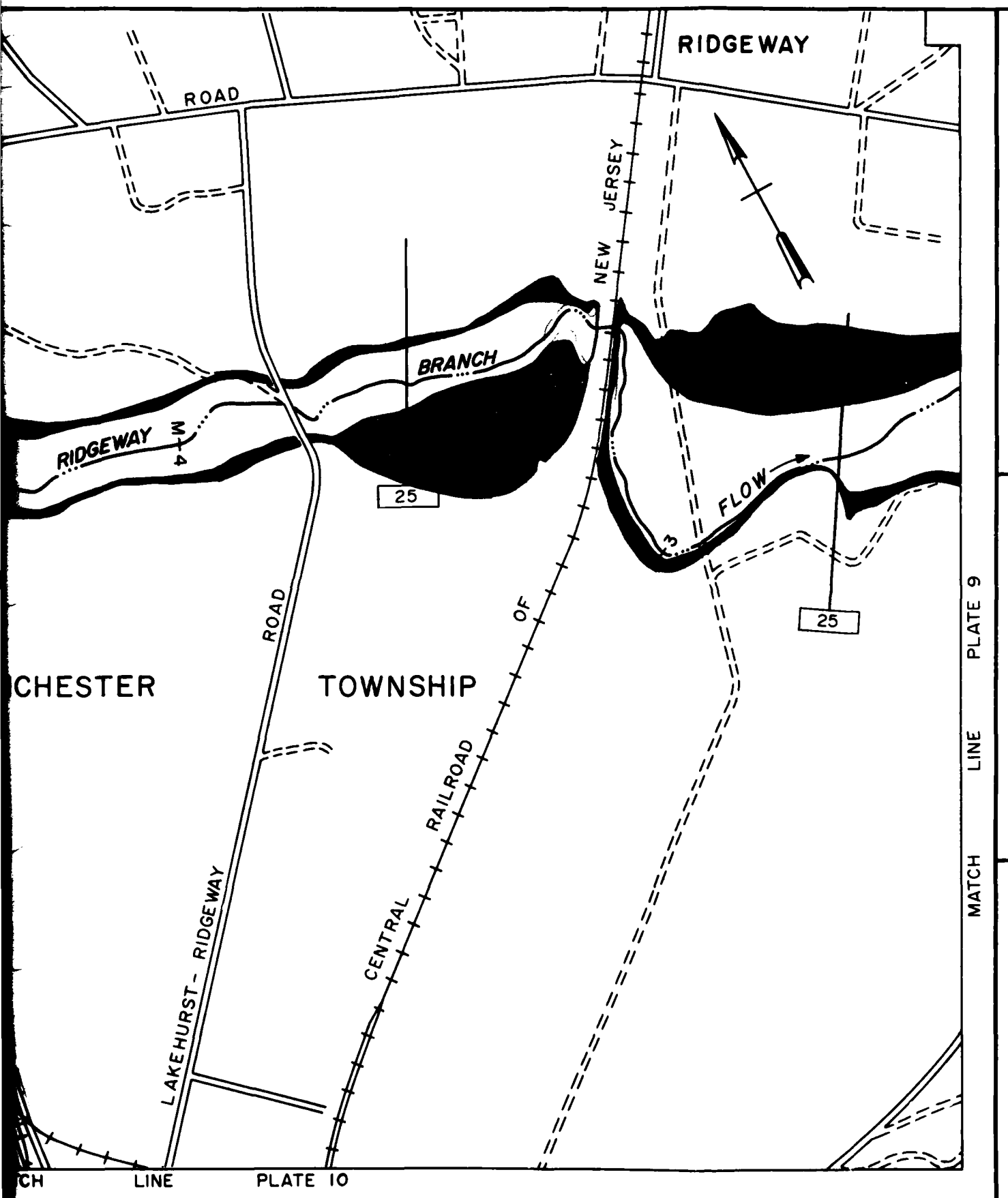
TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS

JUNE 1972

PLATE 10


JACKSON
TOWNSHIP
TOMS
571
ROUTE 547
RIVER
NEW JERSEY
LIMIT
STUDY
RIDGEWAY
27
MANCHESTER
LAKEHURST
NAVAL
AIR
STATION
LAKEHURST-
MATCH
LINE



M+3

25

NOTES

1. MAP BAS
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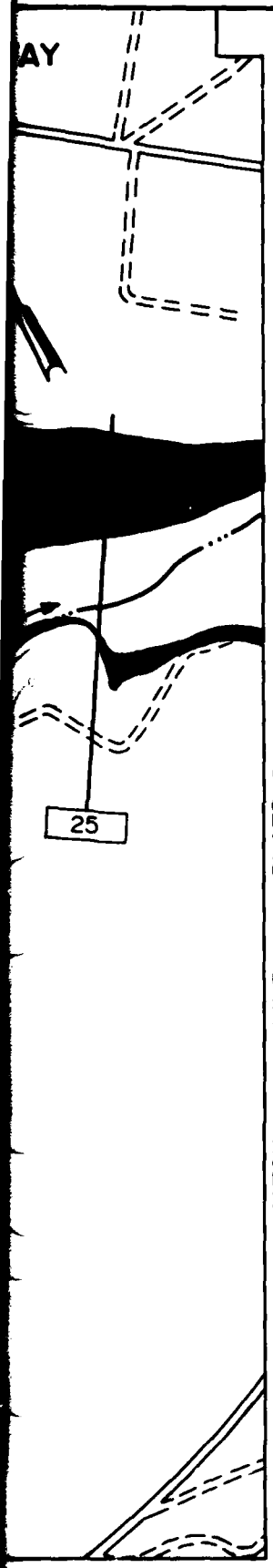

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD — STANDARD PROJECT FLOOD

M+3 MILES ABOVE MOUTH

25 CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

STREAM CENTERLINE

TOWNSHIP OR BORO LIMITS

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET LAKEHURST, N.J., 1957. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
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4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

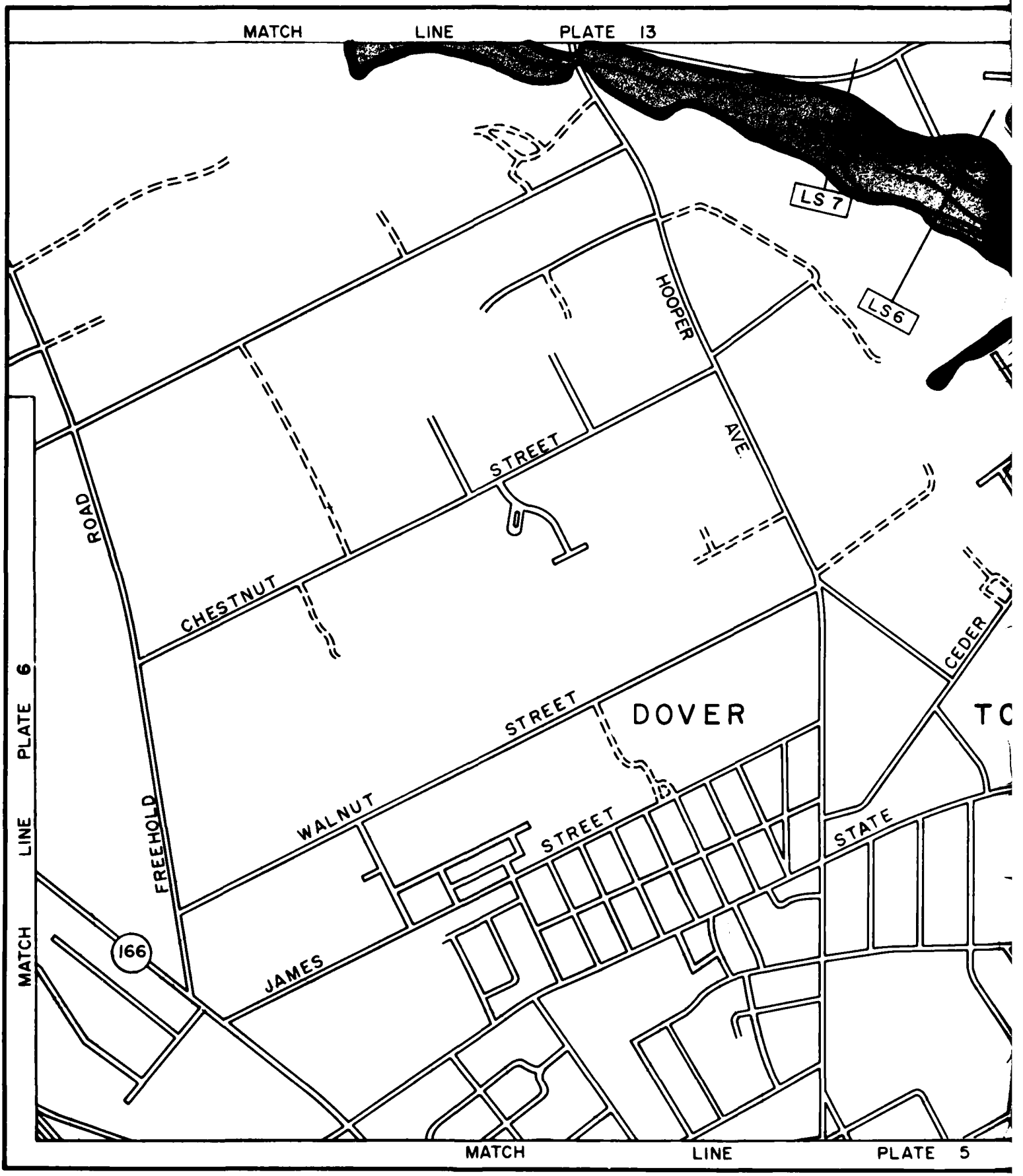
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

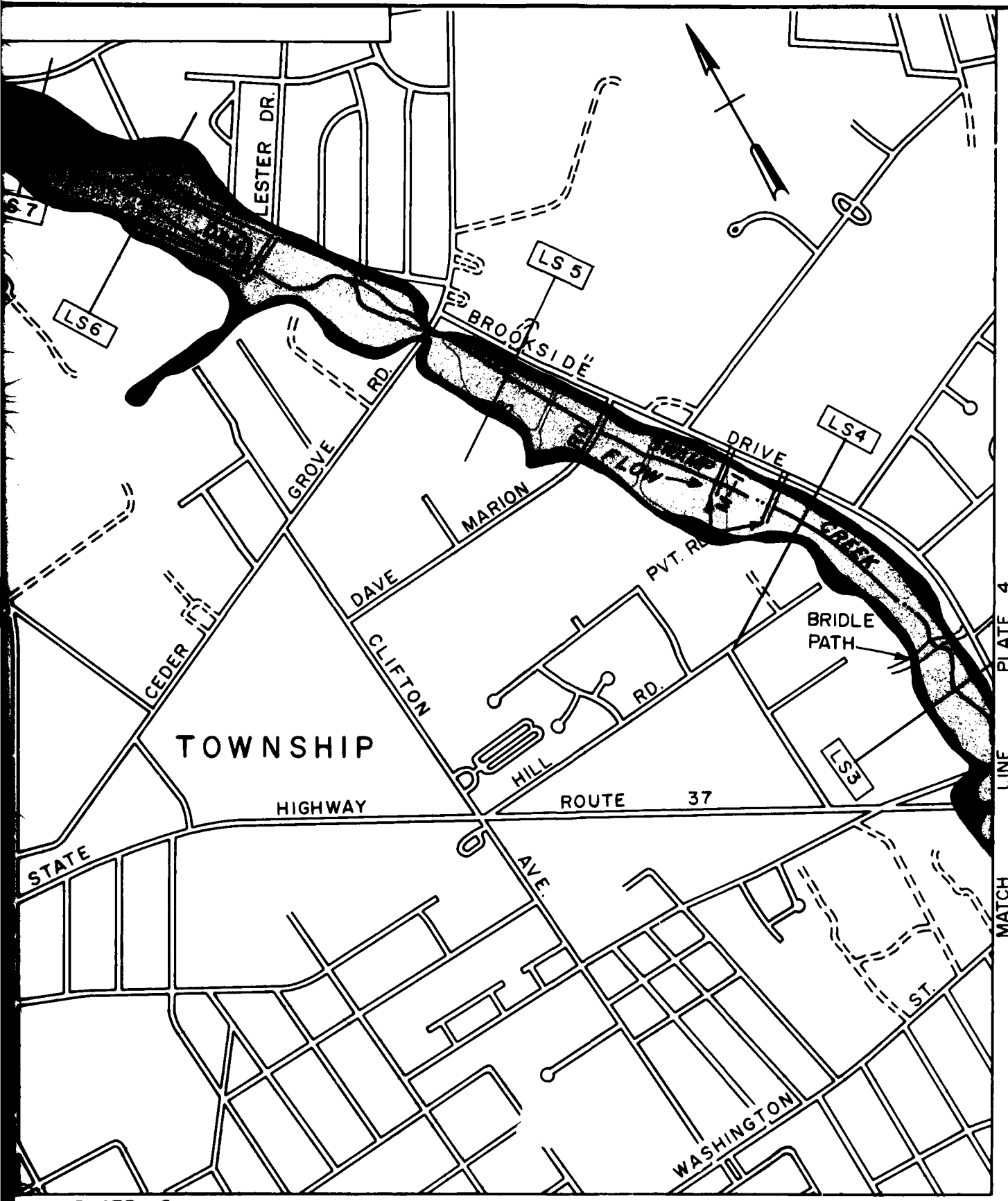
FLOOD PLAIN INFORMATION

TOMS RIVER
OCEAN COUNTY, N.J.

FLOODED AREAS
JUNE 1972

PLATE 11


MATCH LINE PLATE 13
LS 7
LS 6
HOOPER AVE
STREET
ROAD
CHESTNUT
CEDER
DOVER
STREET
WALNUT
STREET
STATE
FREEHOLD
166
JAMES
MATCH LINE PLATE 6
MATCH LINE PLATE 5



M+2

LS 5

NOTES

1. MAP BA
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EXPLAIN
3. AREAS
SUBJEC
4. MINIMUM

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LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD — STANDARD PROJECT FLOOD

M+2 — MILES ABOVE MOUTH

LS 5 — CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

STREAM CENTERLINE

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET TOMS RIVER, N.J., 1953. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
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4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

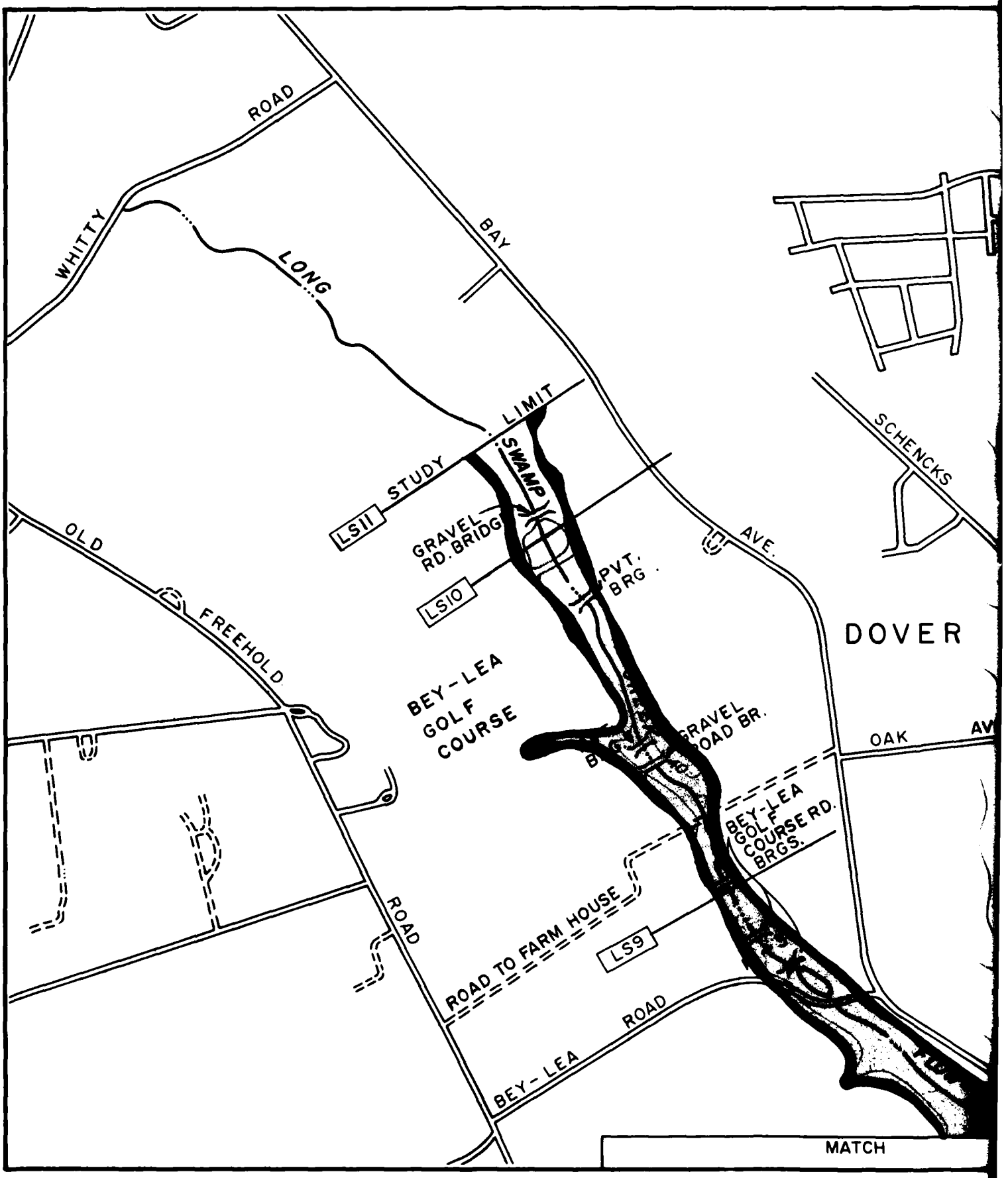
FLOOD PLAIN INFORMATION

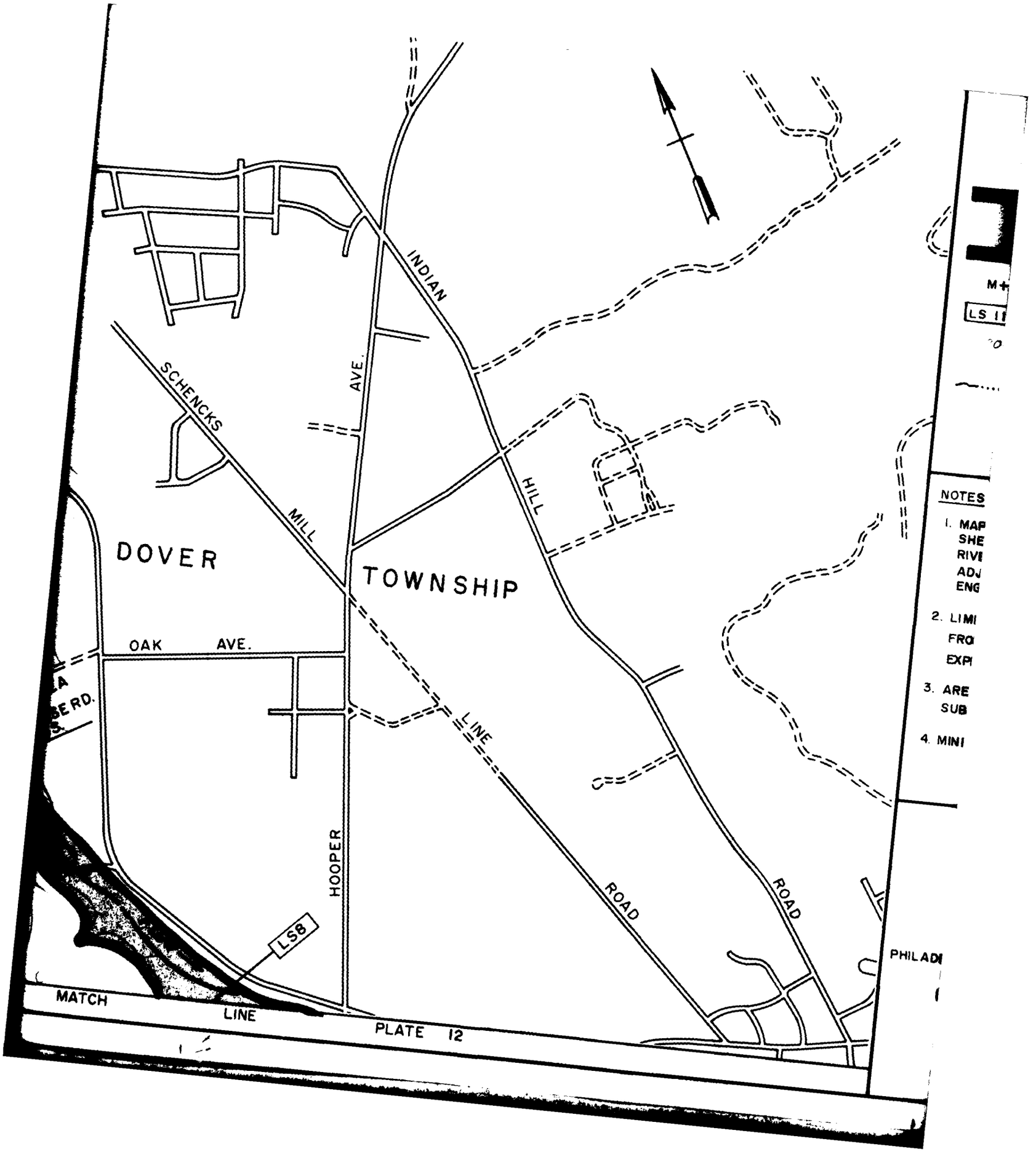
TOMS RIVER
OCEAN COUNTY, N.J.

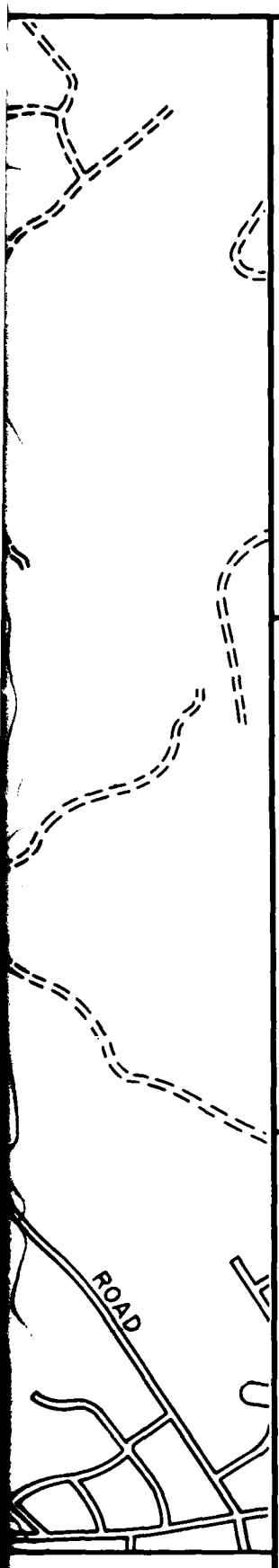
FLOODED AREAS

JUNE 1972

PLATE 12


ROAD
WHITTY
LONG
BAY
LIMIT
SWAMP
STUDY
LS11
GRAVEL
RD. BRIDG
LS10
PVT.
BRG.
AVE.
SCHENCKS
DOVER
OLD
FREEHOLD
BEY-LEA
GOLF
COURSE
GRAVEL
OAD BR.
OAK
AV
BEY-LEA
GOLF
COURSE RD.
BRGS.
ROAD
ROAD TO FARM HOUSE
LS9
BEY-LEA
ROAD
MATCH


INDIAN
AVE.
SCHENCKS
MILL
HILL
DOVER
TOWNSHIP
OAK AVE.
HOOPER
LINE
ROAD
ROAD
LS8
MATCH LINE
PLATE 12
NOTES
1. MAP
SHE
RIVE
ADJ
ENG
2. LIMI
FRO
EXPI
3. ARE
SUB
4. MINI



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD — STANDARD PROJECT FLOOD

M+3 — MILES ABOVE MOUTH

LS 11 — CROSS SECTION

GROUND ELEVATION IN FEET (U.S.C.& G.S. 1929 ADJ.) SEA LEVEL DATUM

STREAM CENTERLINE

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEETS LAKEWOOD, N.J., 1954 & TOMS RIVER, N.J., 1953. MINOR ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
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4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

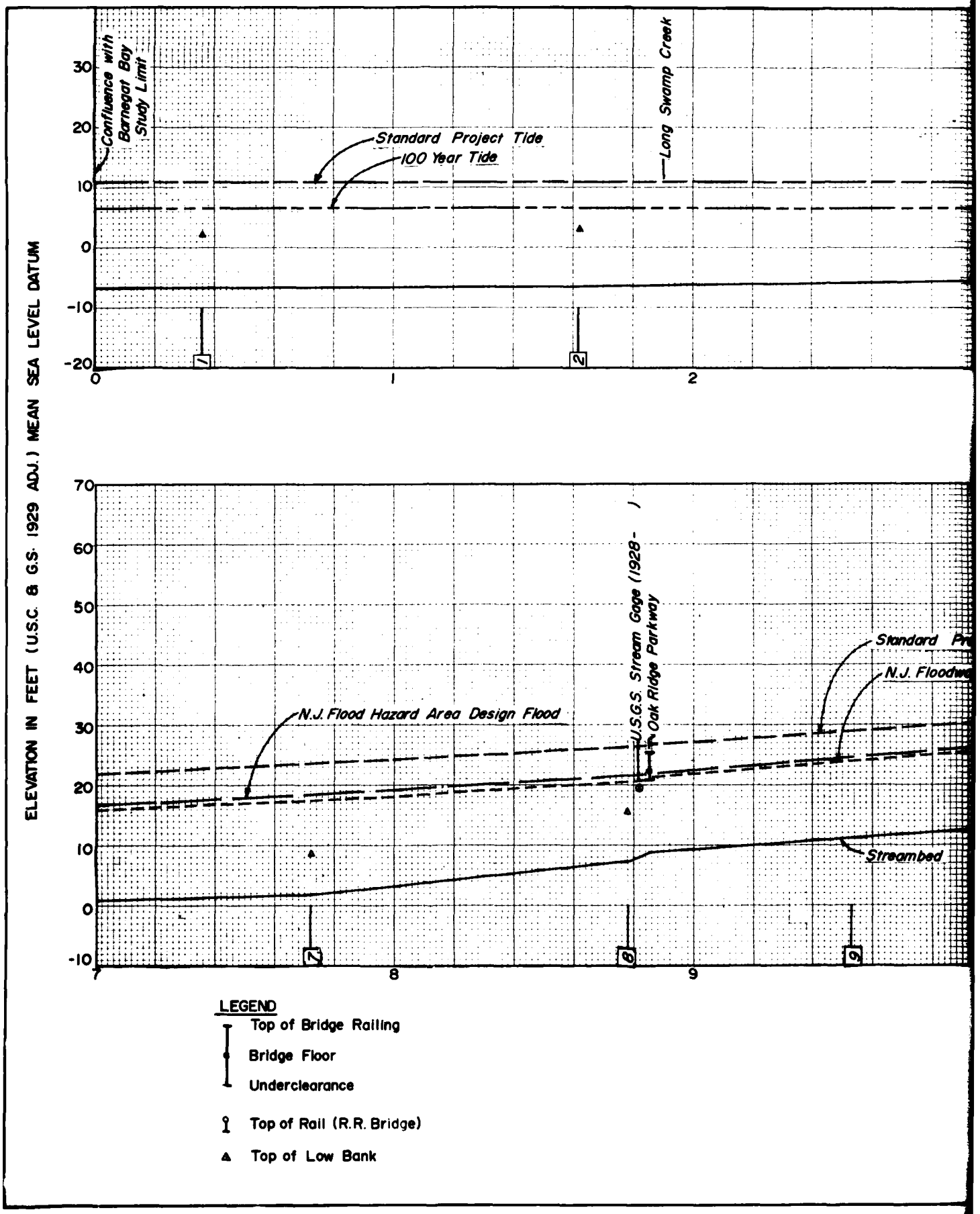
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

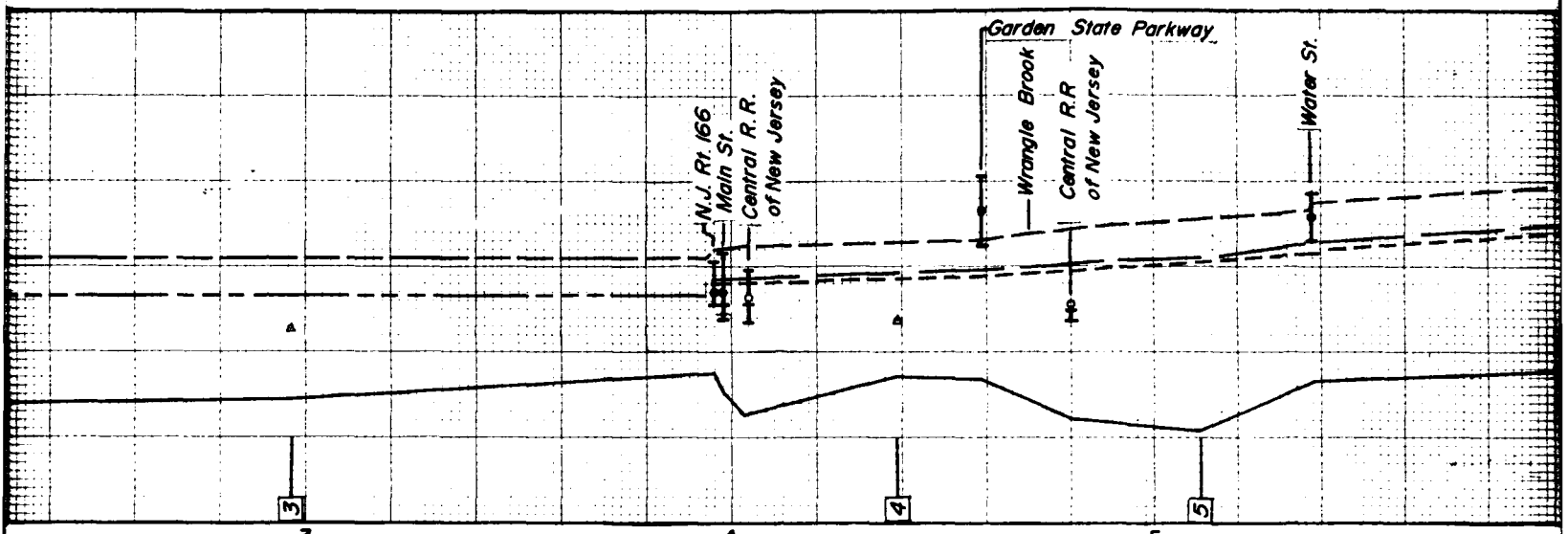
FLOOD PLAIN INFORMATION

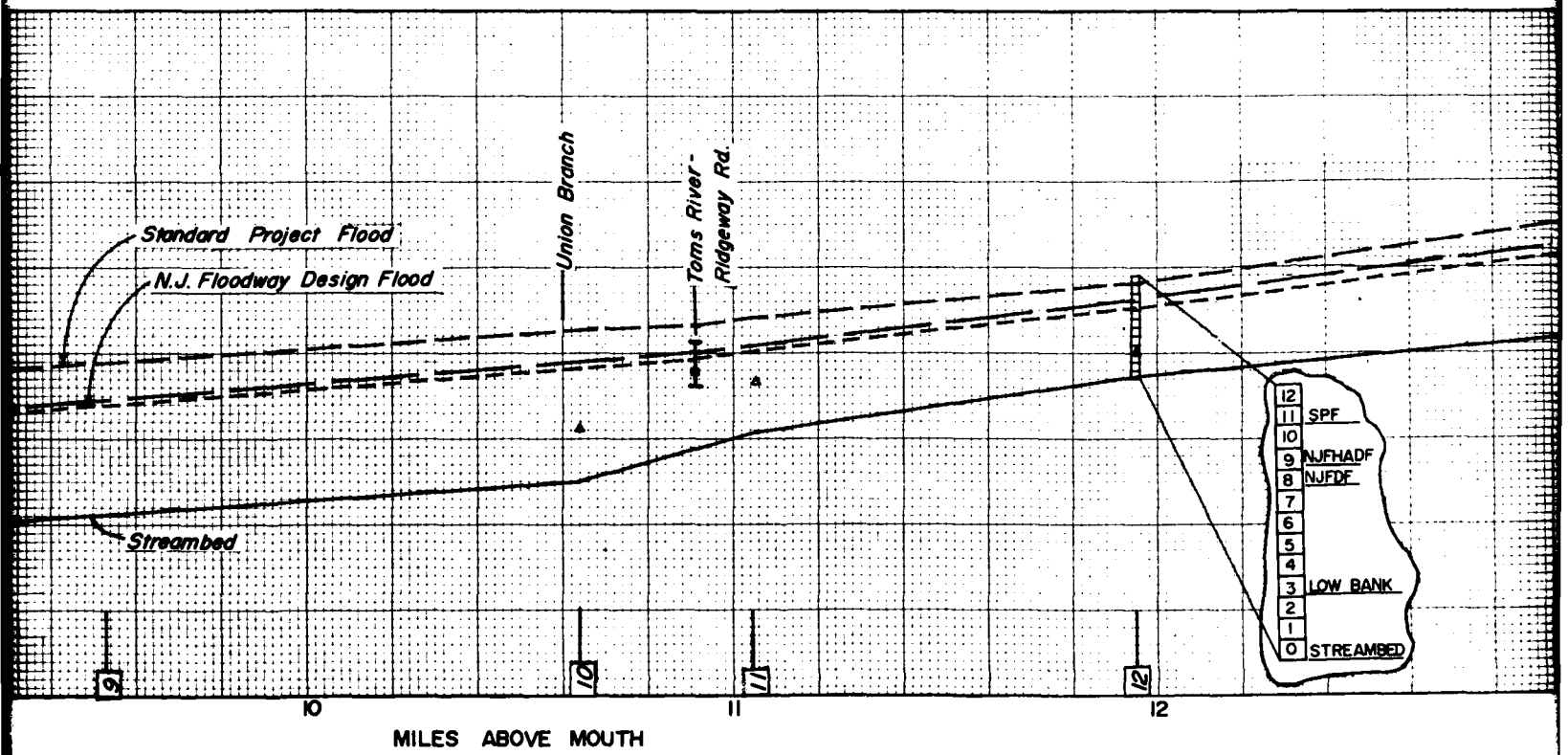
TOMS RIVER
OCEAN COUNTY, N.J.

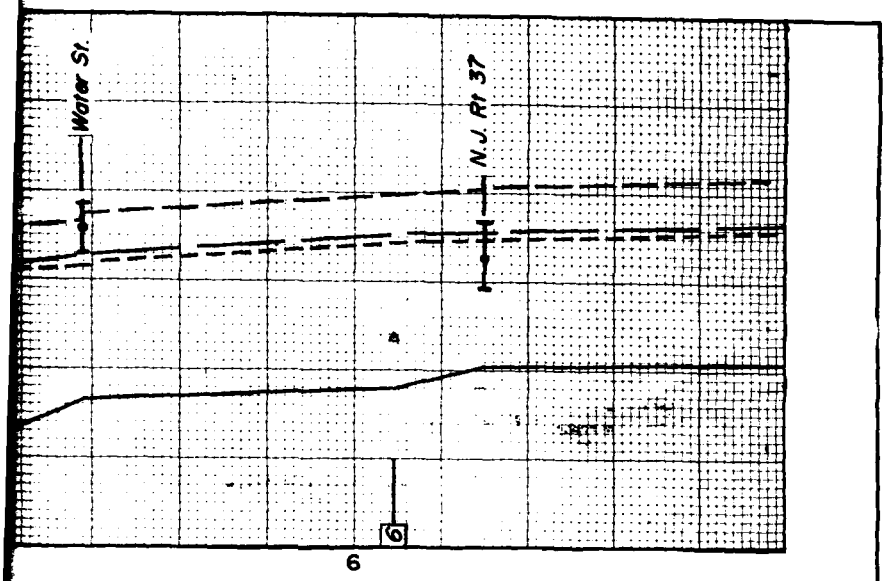
FLOODED AREAS
JUNE 1972

PLATE 13

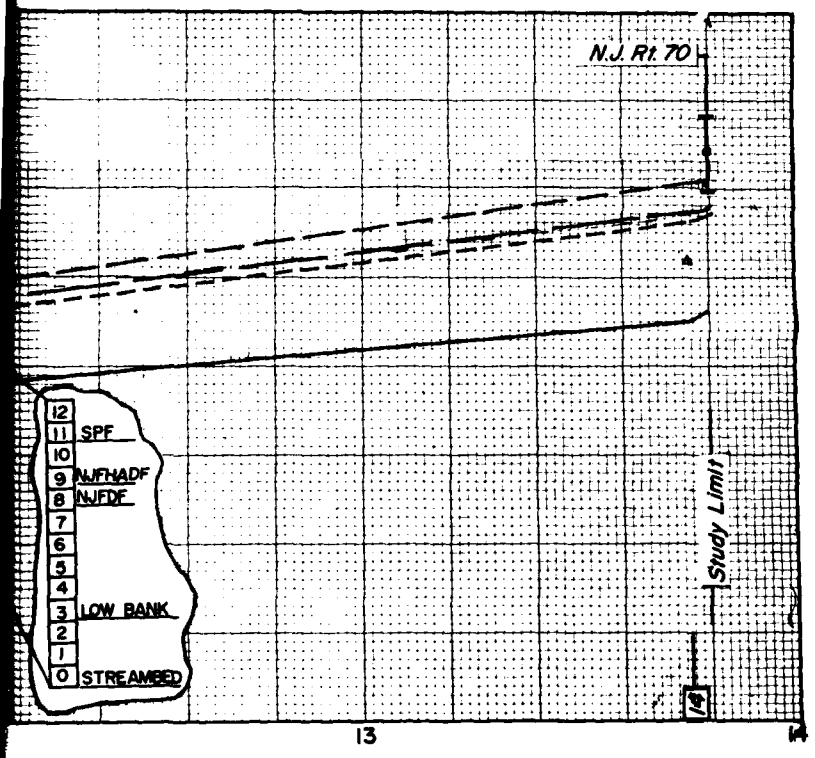

ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) MEAN SEA LEVEL DATUM
Confluence with Barnegat Bay Study Limit
Standard Project Tide
100 Year Tide
Long Swamp Creek
N.J. Flood Hazard Area Design Flood
U.S.G.S. Stream Gage (1928-)
Oak Ridge Parkway
Standard Pr
N.J. Floodwa
Streambed
LEGEND
Top of Bridge Railing
Bridge Floor
Underclearance
Top of Rail (R.R. Bridge)
Top of Low Bank


Garden State Parkway
Wrangle Brook
Central R.R. of New Jersey
Water St.
N.J. Rt. 166
Main St.
Central R.R. of New Jersey
3
4
5
3
4
5
MILES ABOVE MOUTH


Standard Project Flood
N.J. Floodway Design Flood
Union Branch
Toms River - Ridgeway Rd.
Streambed
12 SPF
11
10
9 NJFHADF
8 NJFDF
7
6
5
4
3 LOW BANK
2
1
0 STREAMBED
9
10
11
12
10
11
12
MILES ABOVE MOUTH



6



13 14

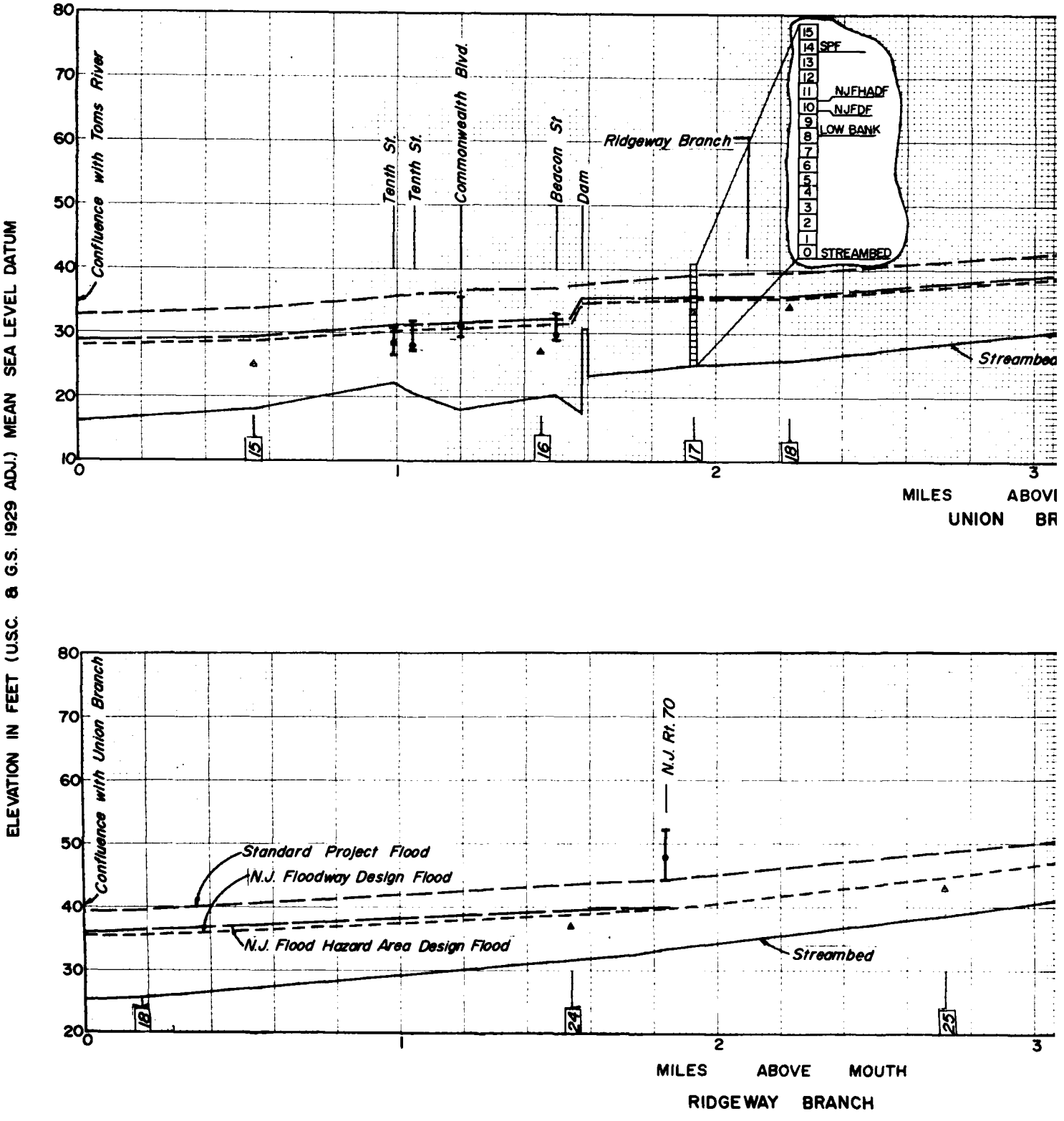
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

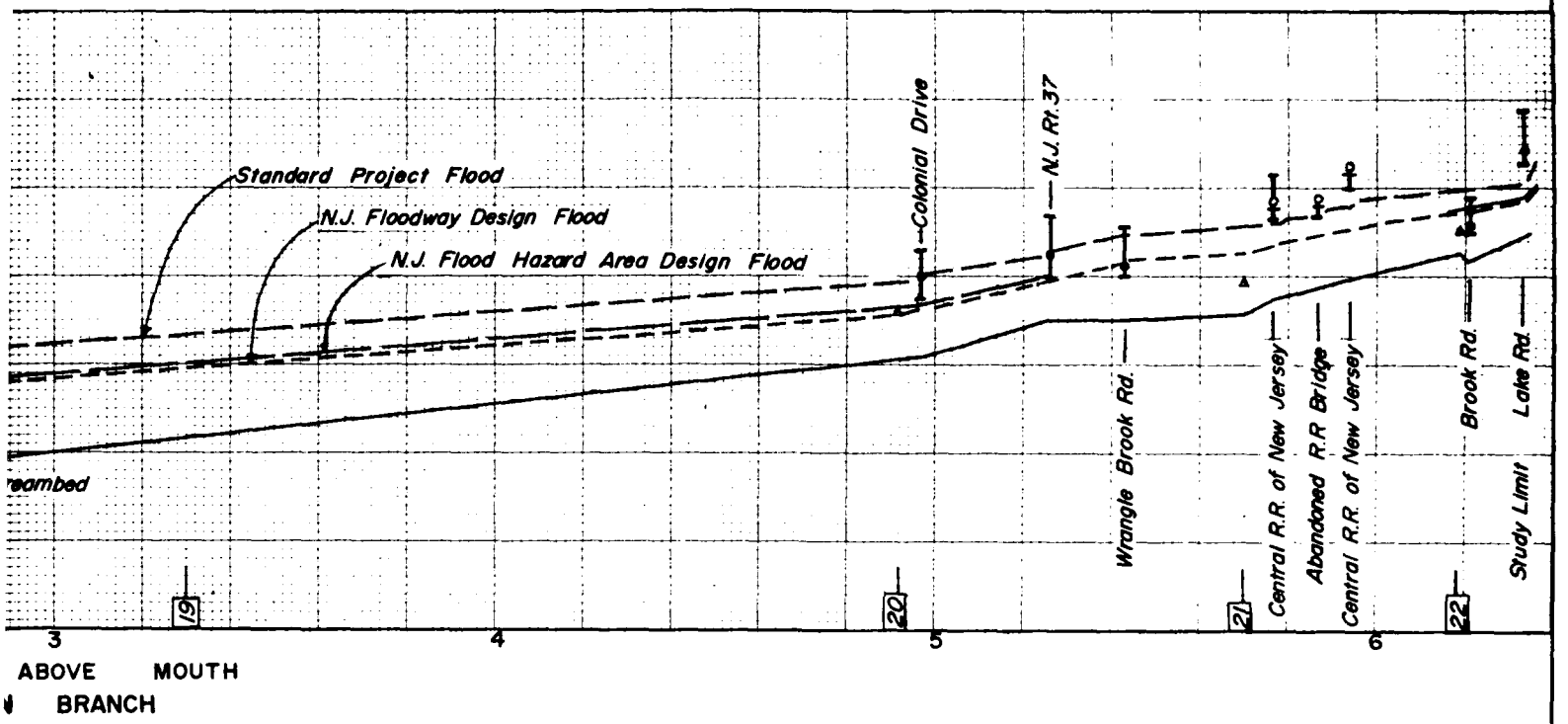
FLOOD PLAIN INFORMATION
TOMS RIVER
NEW JERSEY

HIGH WATER PROFILES
TOMS RIVER MAIN STEM

JUNE 1972

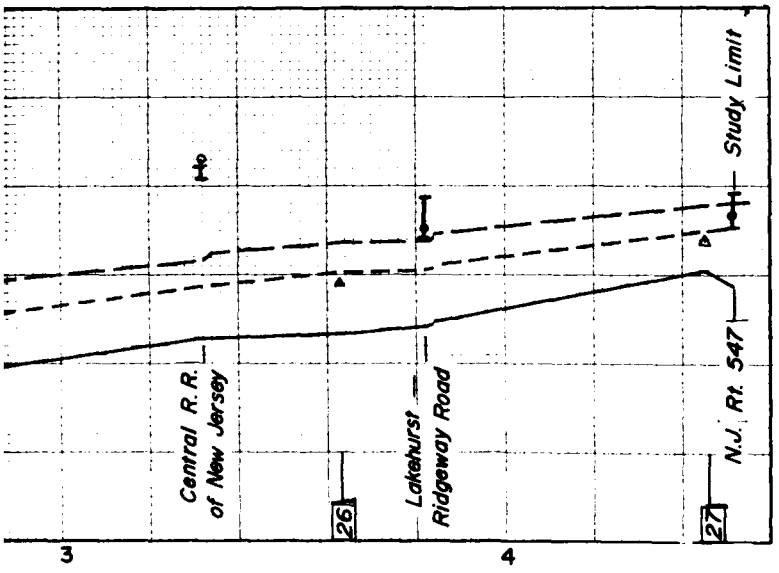
PLATE 14


ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) MEAN SEA LEVEL DATUM
80
70
60
50
40
30
20
10
0
1
2
3
Confluence with Toms River
Tenth St.
Tenth St.
Commonwealth Blvd.
Beacon St
Dam
Ridgeway Branch
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
SPF
NJFHADF
NJFDF
LOW BANK
STREAMBED
Streambed
15
16
17
18
MILES ABOVE
UNION BR
Confluence with Union Branch
N.J. Rt. 70
Standard Project Flood
N.J. Floodway Design Flood
N.J. Flood Hazard Area Design Flood
Streambed
18
24
25
MILES ABOVE MOUTH
RIDGEWAY BRANCH



ABOVE MOUTH

BRANCH



LEGEND

- Top of Bridge Railing
- Bridge Floor
- Underclearance
- Top of Rail (Railroad Bridge)
- Top of Low Bank

NOTE:

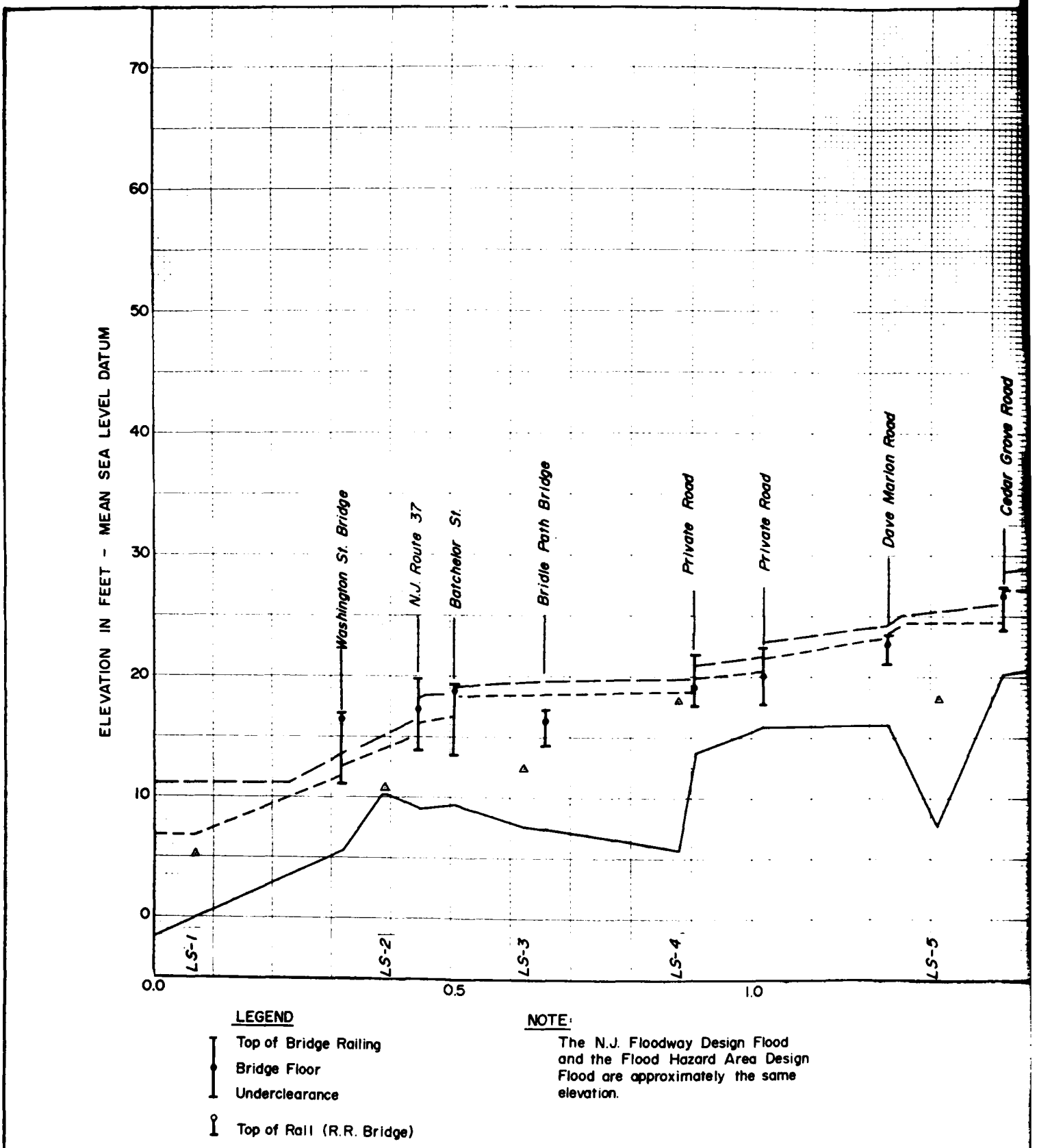
Upstream of N.J. Route 37 on Union Branch and upstream of N.J. Route 70 on Ridgeway Branch the Floodway Design and the Flood Hazard Area Design Floods are approximately the same elevation.

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
TOMS RIVER
NEW JERSEY
HIGH WATER PROFILES
RIDGEWAY BRANCH AND UNION BRANCH

JUNE 1972

PLATE 15

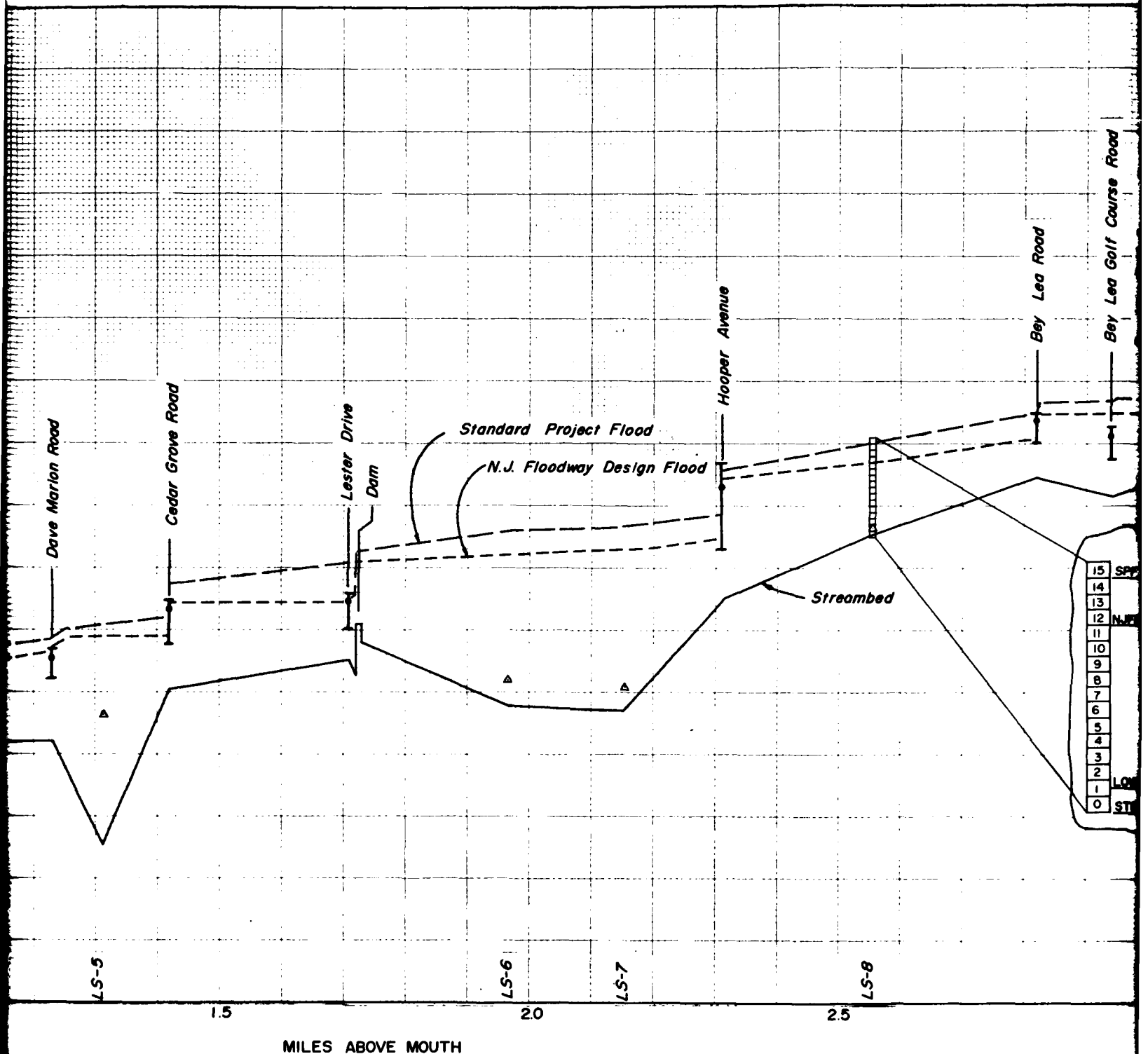


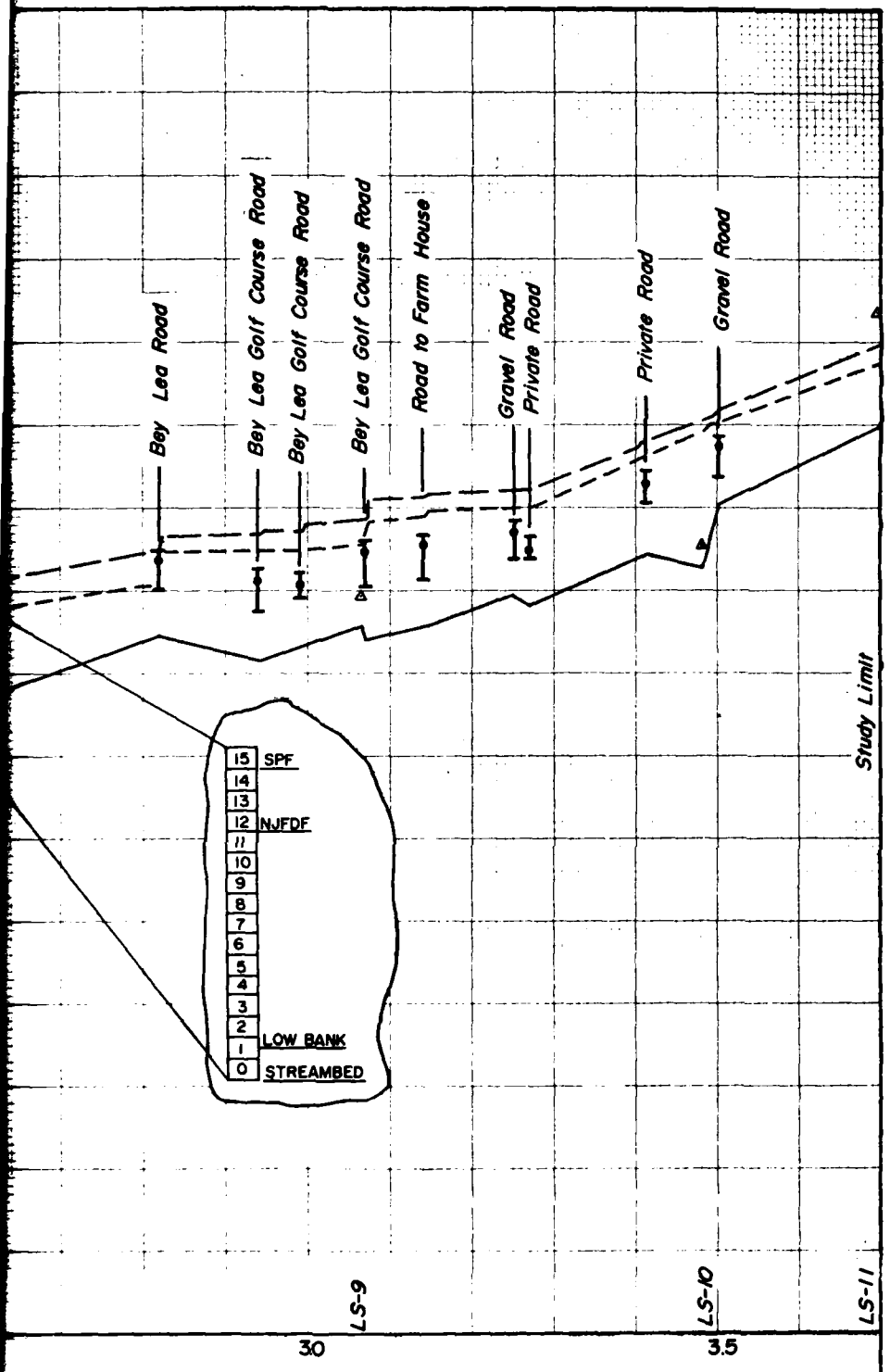
LEGEND

- Top of Bridge Railing
- Bridge Floor
- Underclearance
- Top of Rail (R.R. Bridge)

NOTE:

The N.J. Floodway Design Flood and the Flood Hazard Area Design Flood are approximately the same elevation.

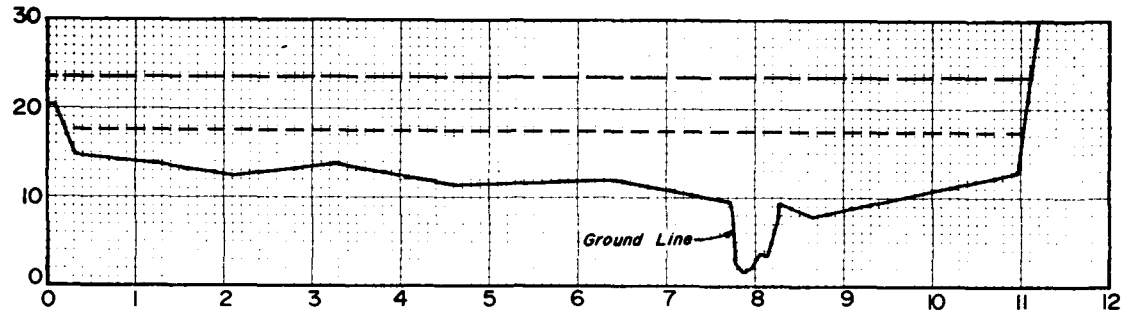

Dave Marion Road
Cedar Grove Road
Lester Drive
Dam
Standard Project Flood
N.J. Floodway Design Flood
Hooper Avenue
Bey Lea Road
Bey Lea Golf Course Road
Streambed
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
LS-5
LS-6
LS-7
LS-8
1.5
2.0
2.5
MILES ABOVE MOUTH



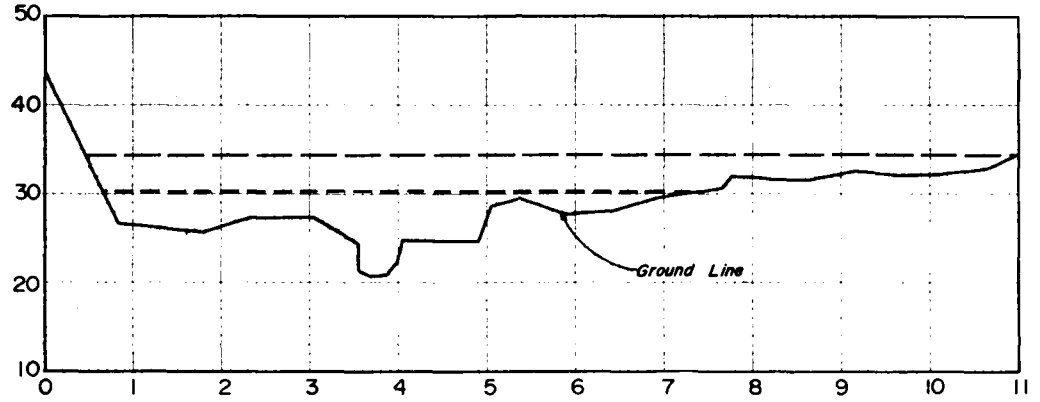
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
TOMS RIVER
NEW JERSEY
HIGH WATER PROFILES
LONG SWAMP CREEK
JUNE 1972

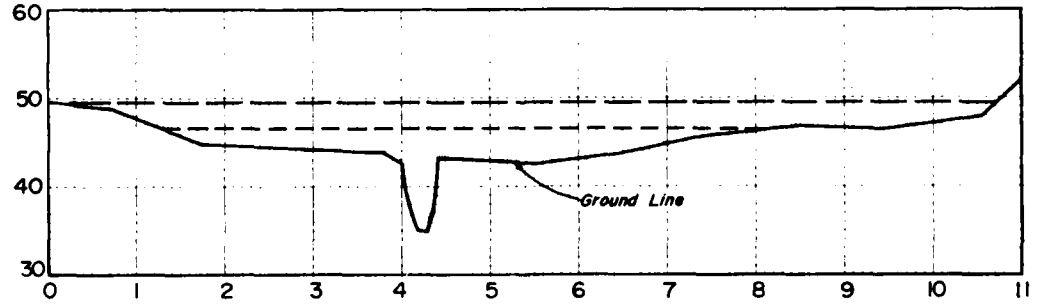
PLATE 16



CROSS SECTION NO. 7
MILE 7.72



CROSS SECTION NO. 11
MILE 11.05



CROSS SECTION NO. 14
MILE 13.75

ELEVATION IN FEET (U.S.C. & G.S 1929 ADJ.) MEAN SEA LEVEL DATUM

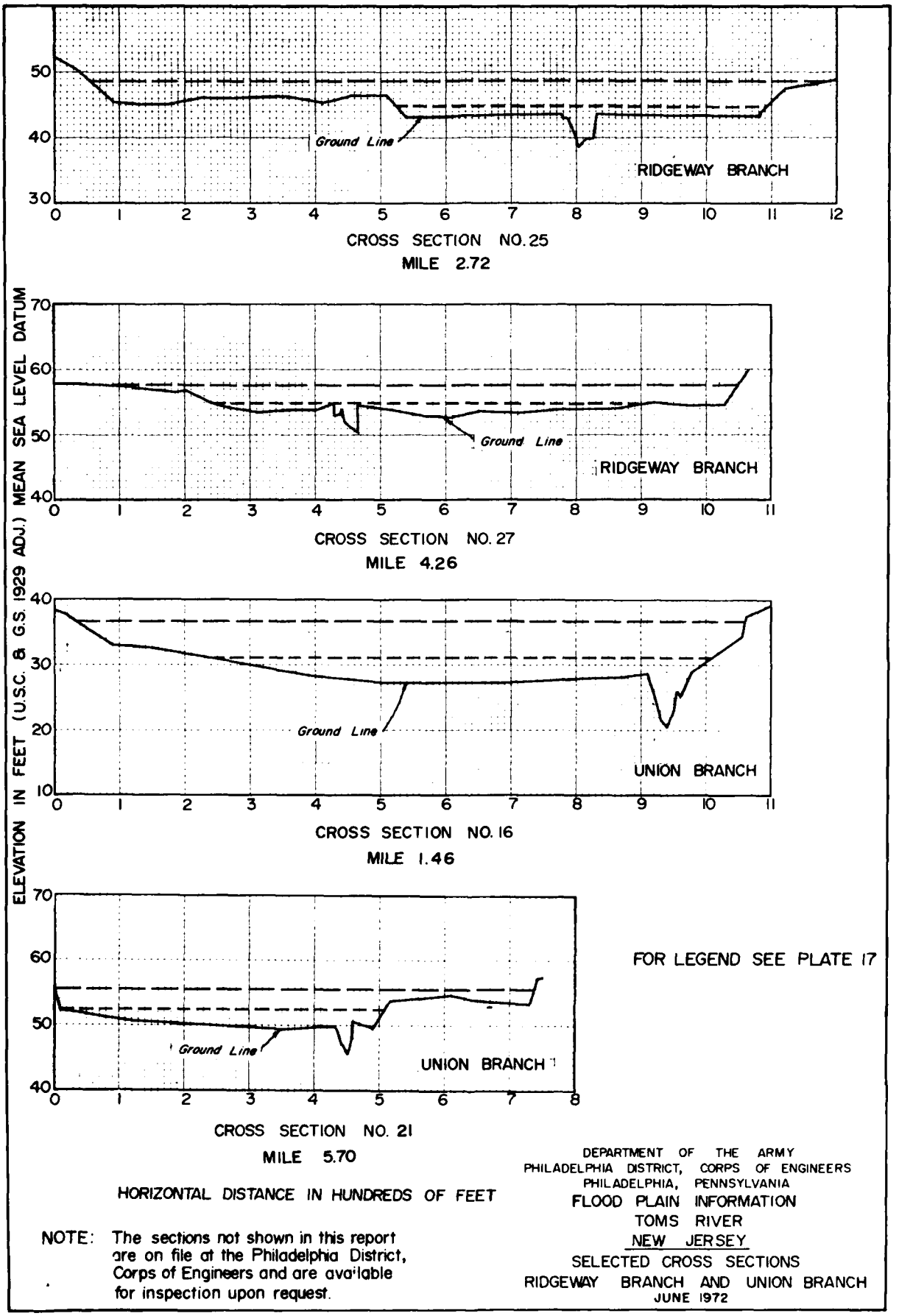
HORIZONTAL DISTANCE IN HUNDREDS OF FEET

LEGEND

——— Standard Project Flood
----- New Jersey Floodway Design Flood
Sections taken looking downstream
20 Sections not shown

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATION
TOMS RIVER
NEW JERSEY
SELECTED CROSS SECTIONS
TOMS RIVER MAIN STEM
JUNE 1972

PLATE 17

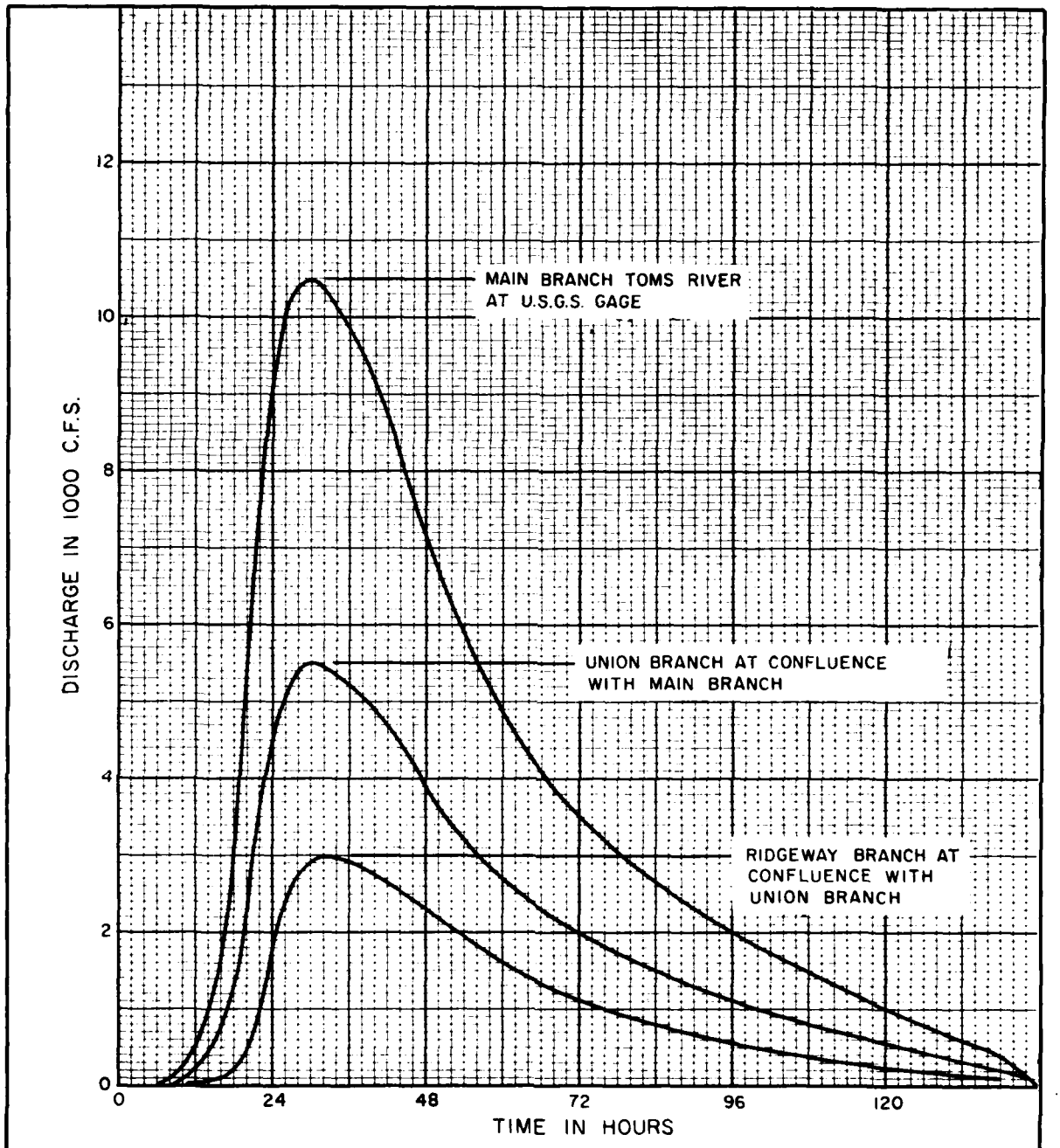


FOR LEGEND SEE PLATE 17

NOTE: The sections not shown in this report are on file at the Philadelphia District, Corps of Engineers and are available for inspection upon request.

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATION
TOMS RIVER
NEW JERSEY
SELECTED CROSS SECTIONS
RIDGEWAY BRANCH AND UNION BRANCH
JUNE 1972

PLATE 18



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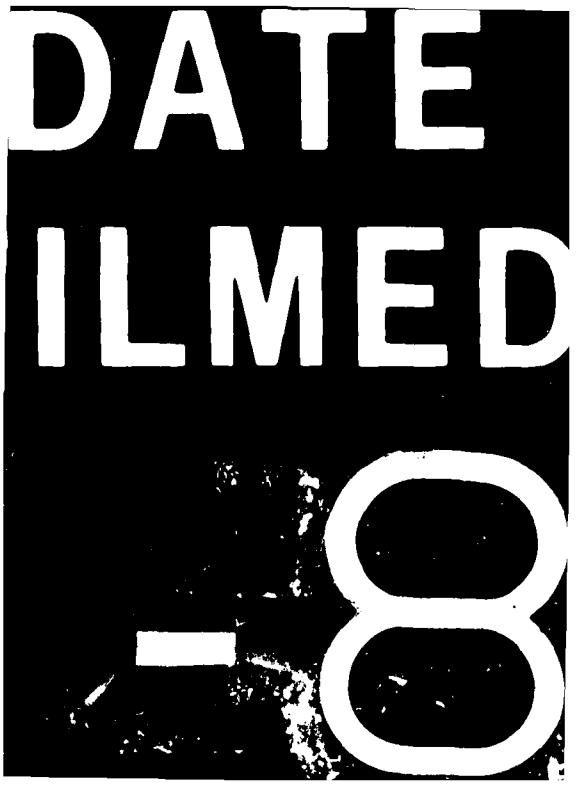
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
TOMS RIVER
OCEAN COUNTY, N. J.

STANDARD PROJECT FLOOD HYDROGRAPH
JUNE 1972

PLATE 19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